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TROPICAL DISEASES BULLETIN.

Vol. 40.] 1943. [No. 4.

SUMMARY OF RECENT ABSTRACTS.*

III. MALARIA.

[*Continued from* p. 195.]

Treatment.

In a special article WHITE (p. 801) has given a résumé of the opinions of a number of authorities on the treatment of malaria. At the present time the subject is dominated by the fact that most of the world supply of quinine has passed into enemy hands, but there is general agreement that atebrin is an excellent substitute for quinine. CHRISTOPHERS argues against the intramuscular injection of quinine even in grave cases, since it causes necrosis of muscle, but this view is not supported by HUGHES or YORKE. Christophers prefers the intravenous route. Hughes, after pointing out that malaria in the adult natives of endemic areas is usually best left alone, emphasizes the necessity for prompt treatment of Europeans in those areas. He advocates the constant administration of 5 grains of quinine daily as a prophylactic, a practice which has stood the test of time. Yorke is an advocate of short courses of quinine for the actual attacks, followed by interrupted administration for several weeks to suppress relapses (see below). The longer courses sometimes advocated lead to great waste of quinine. HILL believes in high dosage of drugs for Europeans in endemic areas, giving 0·3 gm. atebrin and 30 grains quinine daily for seven days, followed by quinine in smaller doses, and plasmoquine. BRYANT (see below) also gives large doses of atebrin. HILL advises intravenous quinine or soluble atebrin in severe cases. For prophylaxis under the conditions of tropical Africa he claims that 5 grains of quinine daily is not enough; he pushes atebrin to 0·1 gm. daily without ill effect. DOVE alternates atebrin and quinine in treatment and follows this with a course of plasmoquine; he does not inject quinine, preferring atebrin intramuscularly for this method. He refers to the neurotoxic action of atebrin when given for long periods, but the other workers concerned in this review make no

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1942, Vol. 39. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

mention of it. In summing up this evidence, White concludes that there is ample justification for the prophylactic administration of atebrin up to a daily dose of 0·1 gm. to susceptible troops in areas where subtertian malaria is prevalent, and that the toxicity of atebrin is not now stressed so much as before by those who have used it most. [See also BISPHAM below.]

YORKE (p. 739) describes the standard treatment of malaria used at Liverpool. This consists of 30 grains of quinine daily for four days followed by 20 grains every Saturday and Sunday for eight weeks, or 0·3 gm. atebrin daily for seven days followed by 0·2 gm. each Saturday and Sunday for eight weeks. Intramuscular injections of quinine are given in severe cases. He points out that atebrin should be used whenever possible, in order to conserve quinine. DAUNCEY (p. 256) is a strong advocate of the value of intramuscular injections of quinine given ½–1 hour before the temperature begins to rise. Five grains given in this way are stated to be enough to cure the acute symptoms, and this procedure effects great saving in quinine.

In the treatment of cerebral malaria WRIGHT (p. 432) relies on intramuscular or oral quinine, since intravenous administration has given but indifferent results in his hands [but he used the intravenous route in " a few desperate cases " only].

NICOL and SHUTE (p. 739) state that 5 grains of quinine daily for 15 days will cure an attack of *P. vivax* malaria and that higher dosage or extended treatment will not prevent relapse. *P. falciparum* requires 10 grains daily for 10 days.

SANDERS (p. 813) writes in favour of a short course of quinidine in the treatment of malaria, but notes that there is a similarity between all anti-malarial drugs in that they cure 65–75 per cent. of cases.

BRYANT (p. 666) is an advocate of heavy dosage with atebrin in the treatment of *P. falciparum* infections. In the Sudan he has given 0·6, or even 0·9 gm. daily, and has seen no ill effects if plenty of hot, very sweet tea (or sugar in some other form) is given. Thus, during the first two days 1·2 or 1·5 gm. may be given (some of this injected in the form of atebrin musonate if necessary); thereafter 0·3 gm. daily until a total of 2·0 to 2·4 gm. has been taken. After an interval of four days this is followed by quinine, 15 grains daily for four days and after a further interval of four days, by plasmoquine simplex, 0·06 gm. daily for 3–4 days, if tolerated.

MEYTHALER (p. 806) is an advocate of short courses and moderate doses of atebrin, except in severe cases, in which he is prepared to give 0·6 gm. daily until the temperature is normal, or to inject atebrin musonate intramuscularly. He draws attention to the value of lumbar puncture in cerebral malaria, and of blood transfusions [see also WILE and MUNDT below]. He also uses quinine-urethane intravenously in severe attacks. In comment MEGAW suggests that a few doses of quinine might be given initially in all cases of subtertian infection, before the course of atebrin is commenced.

SCHÜFFNER (p. 431) states that, in benign tertian infections, relapses occur in at least half the cases, irrespective of the kind or duration of treatment. He therefore advises a short course of treatment, with quinine or atebrin, followed by treatment of relapses as they occur.

NAPIER and CHAUDHURI (p. 121) give details of a course of treatment administered to a patient with benign tertian malaria which relapsed persistently in spite of quinine, atebrin and plasmoquine. Details may be found in the original abstract.

CONDORELLI (p. 257) reports a case of malaria in which an injection of quinine gave rise to a severe state of purpura haemorrhagica. The patient had shown no sign of intolerance to quinine taken as a prophylactic, and the author therefore concludes that it was the association of malaria and quinine which precipitated the condition. SIEGENBEEK VAN HEUKELOM and WAHAB (p. 257) describe a similar case, except that malaria was apparently not a factor. Records of platelet counts are given for this case. FISCHER and STAUPENDAHL (p. 434) report two cases in which mild urticaria due to quinine was followed by severe urticarial dermatitis with marked constitutional disturbance after atebrin had been substituted for the quinine. They suggest that in persons sensitive to quinine a preliminary test dose of atebrin should be given before starting on full doses, and that those found to be hypersensitive to these drugs should not go to malarious countries.

An extensive enquiry has led BISPHAM (p. 178) to the conclusion that the toxic effects of atebrin are of small importance. Slowness of elimination is an important factor in producing such symptoms as do occur, and the author advises that the bowels should be kept freely open and that fluids should be taken copiously, during administration.

DALÉAS (p. 179) writes in favour of the compound Quinobleu, a combination of quinine, suprarenal extract and methylene blue, in the treatment of severe malaria.

LIU *et al.* (p. 179) describe the alkaloid sinine, derived from the root bark of *Fraximus malacophylla*, a tree common in the Yunnan Province of China. It differs in many respects from quinine, but apparently is an effective treatment for malaria of all kinds; stem bark and leaves are also useful.

JACOVACCI (p. 433) writes in favour of Italchina, an Italian acridine derivative, in the treatment of *P. vivax* infections.

FIELD *et al.* (p. 179) have attempted an evaluation of the claims made for the Italian drug M3 in the prevention of malaria. In a controlled experiment in Malaya no prophylactic effect was found.

COGGESHALL *et al.* (p. 395) have tested promin and sulphadiazine against the various forms of malaria of monkeys and man; some action was observed, but the general conclusion is that although these drugs may be looked upon as important substitutes for quinine and atebrin, there are no reasons for giving them in preference to the older drugs. SCHWARTZ *et al.* (p. 601) have used sulphathiazole in treatment of induced *P. vivax* malaria; the results were not very encouraging in the few cases treated.

WINCKEL (p. 121) shows that neoarsphenamine can be used successfully to suppress, though not to eradicate, attacks of *P. vivax* malaria when this infection is used therapeutically. It has no effect on *P. malariae* infections. Different strains of *P. vivax* vary in their susceptibility to the drug. NIVEN (p. 258) has made an estimate of the value of mapharside in the treatment of malaria. It is useful in acute *P. vivax* infections, but its effect in chronic infections was not investigated. Against all forms of *P. falciparum* and *P. malariae* it is useless.

For the dangerous symptoms which may arise during the course of induced malaria, WILE and MUNDT (p. 433) note that blood transfusion is most efficacious in cases of peripheral circulatory collapse, severe anaemia or persistent hypotension. Thio-bismol, given just before an expected chill, may secure a temporary remission.

VELICK (p. 742) shows that anti-malarial drugs can be tested in the Warburg manometer by the effect they have on the oxygen consumption of the parasites.

FIGUEROA (p. 433) has given an analysis of two species of Colombian Cinchona.

Drug Prophylaxis.

For prophylaxis of malaria ROSE (p. 396) advocates the daily administration of 0·06 gm. atebrin rather than of higher doses at longer intervals. In the Balkans the Germans have used specially prepared tablets of 0·06 gm. in this manner. Rose is at pains to point out that atebrin does not cause diarrhoea.

FIELD *et al.* (p. 182) have made observations on the prophylactic effect of plasmoquine, 0·02 gm. given twice each week for a year, in an area of uncontrolled mosquito breeding in Malaya. Most of the malaria was due to *P. vivax*, but *P. falciparum* was fairly common. The transmission of the latter was very low during the period of administration of plasmoquine, and most of the attacks were probably recurrences of old infections. Nevertheless, the authors conclude that in an area in which fresh transmission of *P. falciparum* is slight, and infections are mostly residual or are contracted elsewhere, the prophylactic administration of plasmoquine in this dosage may not markedly affect either the general course or the incidence and severity of clinical attacks. [See also *Treatment*, above.]

Control.

General.—In a review of malaria control issued by the Government of Palestine (p. 592) it is noted that for many years the measures taken have been directed against mosquito breeding. In towns, wells and cisterns have been mosquito-proofed, and other collections of water have been regularly oiled. In the rural areas attention has been paid to prevention of stagnation of water in summer, drainage and irrigation, filling and pumping operations, the clearing of small water-courses and the application of oil or Paris green. Particular mention is made of the alternation of irrigation channels, a system which has been followed for generations near Nablus, which has always been free from malaria though the disease is common in the surrounding villages. In all important drainage schemes channelling by dynamite is the method of choice, but the soil must be wet.

In this work in Palestine the two underlying principles of self-help and the welfare of rural agriculture have been stressed, and the benefit of the various schemes, not only to health, but also to cultivation—for instance the reclaiming of valuable marsh land—has produced in the people a spirit of prompt and energetic co-operation. The success of this long campaign is shown in figures of spleen rates, which in many areas have fallen notably since 1919. But large zones still remain to be dealt with, where the disease is prevalent, for instance the Jordan valley and certain swamps. The populations there are sparse. It is noted that anti-malaria measures are in the hands of the Department of Health ; there is no special anti-malaria service.

DRENSKY (p. 602) points out that in the Struma region of Bulgaria the mortality from malaria may, at times, be greater than that of all other diseases together. An anti-malaria station was founded at Petritsch by the Rockefeller Foundation and during 10 years comparisons of the different methods of malaria control have been made.

The general conclusion is that systematic anti-larval measures such as drainage and the use of Paris green are very effective and cheap, and are much superior to attempts to control the disease by quinine administration alone.

BUONOMINI (p. 18) has studied the Anopheles of a region in the Naples area in which bonification is in progress. Five varieties of *Anopheles maculipennis* are found, of which two (*labranchiae* and *elutus*) are the important vectors. The prevalence of these was found to diminish as the process of bonification proceeded.

ROSS and AYLEN (p. 260) make the point that, in S. Rhodesia, a very large proportion of the breeding places of *A. gambiae* and *A. funestus* are provided, directly or indirectly, by soil erosion. In such places the best methods of controlling malaria are those designed to prevent erosion. They give an account of methods of permanent control which can be adopted under these circumstances.

KINGSBURY (p. 258) refers once more to the effect of the replantation of rubber trees on the incidence of malaria in Malaya; the disturbance of the soil this occasioned affords ideal conditions for the breeding of *A. maculatus*. He mentions measures proposed to control this breeding.

VISWANATHAN (p. 435) shows in a table some of the results achieved by the Assam Medical Research Society in the control of malaria over a period of 10 years. The control of *A. minimus*, the principal vector, has been carried out by means of oil and Paris green, sluicing and shading, and by spraying with Pyrocide 20 in an attack on the adults.

COVELL (p. 259) reports on the permanent anti-malaria measures which have been taken at Delhi.

DE NEGRI (p. 262) discusses the effect of diet on malaria in an agricultural community in the delta of the river Po. Malaria is rife and the diet is insufficient in quantity and unsuitable in quality; in particular there is a shortage of milk for the children. Feeding centres have therefore been established where the children can spend the day, and infected children receive appropriate treatment; a noteworthy change for the better has taken place in the general health of the children as a result of these measures. In comment WHITE remarks that this aspect of malaria control has not received the attention it deserves. [It is an aspect which will need to be stressed when the relief of the people of enemy-occupied malarious countries is undertaken.]

Mosquito-proofing.—In the Tennessee Valley WATSON and MAHER (p. 261) have found that in houses screened against malaria the primary attack rate, per 1,000 days of exposure (calculated from 15th May) was 1·64, against 3·1 in unscreened houses. The parasite indices of persons living in unscreened houses rose during the transmission season; those of persons in screened houses remained constant. It appears, therefore, that mosquito proofing gave very considerable protection against malaria infection. In the same area, HEWITT and KOTCHER (p. 261) found fewer *A. quadrimaculatus* in the screened than in the unscreened houses, but noted that screening did not appear to reduce the number of mosquitoes able to leave the houses after having been stained and released indoors. WATSON and RICE (p. 436) have made further detailed observations on the value of mosquito-proofing in the Tennessee Valley; the amount of protection afforded is very considerable.

FRICKS (p. 521) in a paper published originally in 1920 and republished in 1941, emphasizes the importance of hand destruction of engorged mosquitoes in the prevention of malaria. They are easily destroyed and can be found most readily in rooms with light-coloured walls and, in screened rooms, on the wire of doors or windows.

Insecticidal sprays.—VISWANATHAN (p. 180) has carried out an experiment on the spraying of houses with a mixture of Pyrocide 20 (1 part) and kerosene (19 parts) in Assam, where *A. minimus* is the vector and where malaria is endemic. The houses, which were not completely closed during the process, were sprayed once each week for 9 months ; rather less than half the available houses were sprayed, the unsprayed houses acting as controls. The malaria morbidity of the whole area fell below what would have been expected, but no difference could be found between the morbidity in the inhabitants of the sprayed and the unsprayed houses, except in infants, whose malaria index fell in the sprayed houses while it rose greatly in the unsprayed. Spleen rates were the same in the two groups, but there was a decline in parasite rate in the sprayed houses, which was not found in the unsprayed. Infestation of anophelines did not differ greatly, but fewer infected specimens were found in the sprayed houses.

RUSSELL and KNIPE (p. 667) report on the results achieved in the third season of their method of malaria control by spray-killing adult mosquitoes. The ordinary " flit gun " sprayer is wasteful and inefficient and a small petrol engine compressor has been used for the air tanks ; the best method for generating gas pressure is by the use of solid carbon dioxide, but this is too expensive for general use. [An apparatus for the use of carbon dioxide is described by KNIPE (p. 181).] In the meantime efforts to devise a suitable apparatus are continuing. The general results of spray-killing on the incidence of malaria are good ; a local extract of Pyrethrum is much cheaper than Pyrocide 20 and is equally effective. Spleen rates have shown a notable fall and parasites a downward trend in the sprayed villages but have risen slightly in control villages. Cost has been reduced and the villagers like the method ; local free labour would still further reduce cost.

RUSSELL and MENON (p. 808) have endeavoured to ascertain the economic burden of malaria on the inhabitants of a rural area of Madras. They conclude that the direct financial loss due to malaria is considerably greater than the amount it would cost to control the disease by spray-killing adult mosquitoes, but they also suggest that as most of the breeding is due to irrigation, a portion of the irrigation tax should be set aside for control measures.

Water control.—LEE (p. 397) describes the importance of the study of the water table, by means of experimental tube wells, before embarking on drainage or filling schemes, and during the operation of these schemes.

TWEEDIE *et al.* (p. 522) give details of the construction of fascine drains, which have given satisfactory results in the water-courses which provide the principal breeding places of *A. maculatus*. The method cannot further be abstracted, but is set out in some detail, with illustrations, in the original summary.

EJERCITO and CELIS (p. 262) describe an automatic siphon for the control of streams of considerable size.

REKSODIWIRJO (p. 437) describes the construction of two automatic drainage valves to shut off surface drains from tidal water.

RAO (p. 299) reports that the treatment of rice fields, in the coastal plain of Orissa, by soaking them with sullage once each week during the dry season, results in great reduction of breeding of *A. annularis*, the common malaria vector, during the rains. The sullage was allowed to run over the field to a depth of about ½ inch, and the field usually dried in 24–36 hours; it was ploughed once each month until the rains, after that irrigation was by rain only. A list is given of the mosquitoes found in the sullage-treated and control fields; the reduction of *A. annularis* is very evident and the author suggests that this method may have a wide application.

PENFOUND (p. 740) discusses the effect of flooding on trees and other plants, with relation to impounded waters, and the possible production of mosquito breeding places.

ROY and ROY (p. 437) have noticed that the aquatic plant *Pistia stratiotes* is invariably present in tanks and other breeding places of Anopheles in the Murshidabad area. Removal of *P. stratiotes* from all water tanks in one village resulted in great decrease in the incidence of malaria. In another village removal of other aquatic plants, leaving *P. stratiotes* intact, resulted in an increase of malaria. The vector was not identified but *A. philippinensis* was suspected.

Larvicides, etc.—MCMAHON (p. 396) notes that used motor engine oils have no toxic properties on mosquito larvae, and kill only by cutting off air supply. Except in very heavy dosage these oils cannot be relied upon; the addition of kerosene in relatively large quantity is necessary to produce good results, and is therefore uneconomical.

MISRA (p. 437) describes two methods of oiling streams by means of automatic drip systems.

JORDAN and SILVEY (p. 122) consider that a Pyrethrum-containing larvicide is best suited to local conditions in Shanghai, and advocate an emulsion in soap and water of a light oil containing Pyrethrum extract. Paradichlorbenzene is a stable addition and permits reduction in the quantity of Pyrethrum, and tetrahydronaphthalene has a similar effect. These compounds are cheaper than the Pyrethrum extract. JETTMAR (p. 122) states that powdered Pyrethrum scattered over water in the proportion of 50–100 gm. per 1,000 litres kills culicine and anopheline larvae, and advocates this method for tanks or small collections of stagnant water.

LVOVSKY (p. 603) has found chlorophenol an effective larvicide, especially when mixed with petroleum; it is cheap and easy to store.

KENNEDY (p. 181) shows that copper sulphate, in a dilution as low as 1 part (anhydrous) in 100,000, is lethal to larvae of *A. maculipennis atroparvus*.

JOB (p. 668) has conducted an experiment by dividing a borrow pit into three parts by means of bunds. One section was treated regularly with Paris green; the second was stocked with the fish *Aplocheilus panchax*; the third was held as control. The fish were more effective than Paris green in destroying the aquatic forms of anophelines and culicines, and at a much smaller cost.

SCHARFF and TWEEDIE (p. 814) note that at Singapore the mud lobster *Thalassina anomala* has a bearing on malaria in that it damages tidal bunds by burrowing, and that the "crab holes" it makes may provide breeding places for mosquitoes. By pouring into the holes a mixture of lime and water (5 lb. to 3 gallons) and ramming sand on top, the lobsters can be destroyed, and by incorporating fibrous material from

coconut palms, soaked in coal tar, in the bunds, burrowing will be prevented.

Malaria of Monkeys and Birds.

Monkeys.—MAIER and COGGESHALL (p. 397) show that blood infected with *P. knowlesi* and other malaria parasites takes up far more oxygen than normal blood while the parasites survive, and that glucose is used up. If the glucose is not renewed the oxygen uptake declines, but certain other sugars can be used in place of glucose. These authors (p. 397) failed to correlate the therapeutic effects of nine drugs with their action in interfering with parasite respiration, and conclude, therefore, that the effect of a drug on parasite respiration cannot be relied upon to furnish an index of therapeutic efficiency.

DEVINE and FULTON (p. 438) have examined the pigment produced by *P. knowlesi*; it is indistinguishable from haematin. MORRISON and ANDERSON (p. 741) agree with SINTON and GHOSH that the pigment of *P. knowlesi* is haematin (ferrihaemic acid). These authors (pp. 604, 741) have shown that disodium ferrihaemate (alkaline haematin) causes an acute toxic reaction when injected into monkeys, but they conclude that the symptoms of the malarial paroxysm cannot be due to this substance since the pigment is not liberated in a soluble form from the malarial parasites. ANDERSON *et al.* (p. 811) have injected disodium ferrihaemate intravenously into dogs; it produces marked vascular reactions and renal lesions. Many of the changes are similar to those which occur in malaria and blackwater fever.

RAY *et al.* (p. 741) have carried out an agglutination test on monkeys recovered from *P. knowlesi* infection, with an antigen of infected red cells containing a high proportion of mature parasites. Agglutinins appear after the acute phase of infection has passed, and increase during the course of chronic infection; they may be present in monkeys immunized by injection of killed parasites.

FULTON and YORKE (p. 438) show that a strain of *P. knowlesi* in monkeys, which at first was held in check by relatively small doses of plasmoquine, became, after repeated exposure to the drug, so resistant that it was not influenced by four times the original dose. This resistance was maintained after passage to other monkeys. [Compare FULTON below.]

DIKSHIT (p. 524) has shown that the replacement of 80 per cent. of the blood of a monkey immune to *P. knowlesi* by non-immune monkey blood produces no loss of immunity, and that the replacement of 70 per cent. of blood of a normal monkey by immune monkey blood results in the acquisition of immunity. The cellular and humoral elements, therefore, work in close co-operation, the latter acting probably by stimulation of the cells rather than directly on the parasites.

COGGESHALL (p. 400) shows that *A. quadrimaculatus* is readily infected by *P. cynomolgi* and transmits the infection to normal rhesus monkeys. This mosquito can also be infected by *P. lophurae.*

Birds.—The injection of colloidal palladium intravenously into chickens produces blockage of the reticulo-endothelial system with subsequent hypertrophy of the cells of that system, but these changes are limited to the cells within the vascular system. SCHULEMANN and KNOCHE (p. 25) have shown that such injections, made at different stages of infection with *P. gallinaceum*, delay the appearance, or reduce the number, of erythrocytic schizonts, but greatly increase the number of exoerythrocytic schizonts in every organ, to such an extent that the

vessels of the brain may be filled. The explanation offered is that after palladium injections the hypertrophy of the reticulo-endothelial system is accompanied by great increase in phagocytic power. Large numbers of infected red cells are phagocyted, but many of the contained parasites survive, to develop into exoerythrocytic schizonts. The increased phagocytosis means that fewer infected red cells remain in the circulation, and blood infection, therefore, is not so intense as in birds not injected with palladium. This work, of course, postulates that exoerythrocytic forms may arise from erythrocytic forms, and this contention is supported by the work of ZAIN (p. 26), who found that both forms could be found in fowls inoculated with blood taken from other fowls at the height of infection. Moreover, the supernatant fluid from citrated blood taken during infection is infective and leads to the formation of exoerythrocytic schizonts, but if the fluid is passed through a filter with pore measurements of $2{\cdot}27\mu$ or less, infection is prevented. Examination of material held back by the filter showed, among other forms, a number of mature pigmented schizonts larger than merozoites, and it is concluded that these schizonts, which are not removed from the supernatant fluid by centrifugation, are the infective agents. It seems, therefore, that exoerythrocytic schizonts may arise from the erythrocytic forms, but in this case they appear at a later stage than when derived from an infection with exoerythrocytic schizonts.

ZAIN (p. 669) points out that the injection of blood containing erythrocytic forms of *P. gallinaceum* into fowls causes a late appearance of exoerythrocytic schizonts in the brain; the inoculation of sporozoites leads to their early appearance. If the exoerythrocytic forms developed from erythrocytic forms are injected, they lead to early appearance of exoerythrocytic forms, as after sporozoite inoculation.

CORRADETTI (p. 668) considers that when sporozoites or exoerythrocytic forms of *P. gallinaceum* are injected into fowls, invasion of the reticulo-endothelial cells occurs, with the development of exoerythrocytic schizonts because there is as yet no immunity. As immunity develops, the exoerythrocytic cycle ceases. He does not consider that resistance to drugs, and relapses, are due to exoerythrocytic forms, since these forms may not be present in birds showing these features; relapses are due to persistent erythrocytic forms which have taken on renewed activity.

SEETHARAMA IYER *et al.* (p. 524) have found exoerythrocytic schizonts of *P. gallinaceum* in fowls infected by sporozoites as early as the fifth day. They conclude that these forms develop from sporozoites and may later give rise to the pigmented erythrocytic forms.

MISSIROLI (p. 123) maintains that sporozoites of bird malaria parasites do not undergo development within endothelial cells, but that they develop extracellularly in the lymphatics draining the point of injection, and that the merozoites so formed enter red cells or tissue cells according to the species of parasite concerned. WENYON criticizes this work in that deductions are made from the fact that parasites are seen outside the cells in smears from spleen or liver; these may not be truly extracellular but may have been extruded from the cells in the process of smear-making, and the limits of cell cytoplasm are not clear in such smears.

KIKUTH and MUDROW (p. 399) discuss the development of sporozoites after injection into birds. In their view the sporozoites, after an initial delay, become uninucleate rounded bodies within cells of the

reticulo-endothelial system at the site of inoculation or in the internal organs. Merozoites are then formed and may enter other reticulo-endothelial cells or red blood cells.

RUSSELL *et al.* (p. 300) report the finding that sporozoites of *P. gallinaceum*, dissected from the salivary glands of mosquitoes and subjected to ultra-violet radiation, when injected into fowls will not cause infection but will stimulate the production of agglutinins to higher titres than are commonly found after natural infections. In a second paper the same authors (p. 300) show that subsequent infection of fowls inoculated in this manner takes place readily, but that the severity of the attacks varies inversely as the titre of agglutinins: low titre, attacks of normal severity; high titre, attacks mild and mortality rate low or absent.

BELTRAN and LARENAS (p. 399) confirm the work of SHORTT and MENON that chickens may be infected with *P. gallinaceum* by the introduction of infected blood into the mouth. YOUNG (p. 400) has infected pigeons with *P. relictum* by the same route, and looks upon this as affording further evidence that the parasites may be able to live in types of tissue other than blood. BELTRAN and VARGAS (p. 670), however, have failed to infect chickens with sporozoites of *P. gallinaceum* by the oral route.

ADLER and TCHERNOMORETZ (p. 524) have shown that in fowls infected with *P. gallinaceum*, quinine will eliminate erythrocytic schizonts but leaves the exoerythrocytic forms intact. The exoerythrocytic schizonts may be passaged by inoculation of brain emulsions, and, provided that quinine administration is maintained, the pigmented erythrocytic forms do not appear, but are soon found if quinine is stopped.

HEGNER *et al.* (pp. 124, 398) have found the quinine derivative hydroxyethylapocupreine to be as effective as, and less toxic than, quinine in certain forms of bird malaria; it is probable that this derivative will prove effective in human malaria.

AFRICA *et al.* (p. 27) find that prontosil has a decided action in clearing the blood of birds infected with *P. relictum*, but that it does not prevent relapses even though continued long after the blood is clear. This result is contrasted with the failure of COGGESHALL to influence, with sulphanilamide, *P. lophurae* and *P. cathemerium* in birds, and *P. vivax* in man, but is compared with his success with *P. knowlesi* in monkeys.

FULTON (p. 815) has failed to render a strain of *P. gallinaceum* resistant to plasmoquine. This failure may be correlated with the presence of exoerythrocytic schizonts, which are known to be unaffected by the drug, and which were found to be equally prevalent in treated and untreated birds. [Compare FULTON and YORKE above.]

VEZZOSO (p. 605) states that although serum from birds which have recovered from *P. gallinaceum* infection will not confer passive immunity if taken from birds some months after recovery, it will produce some degree of immunity if taken from birds within 10 to 50 days of recovery.

BOYD and DUNN (p. 439) have previously shown that quinine and plasmoquine act, in *P. cathemerium* infections, by inhibiting reproduction of the parasites and by causing reduction in the size of the schizonts so that few merozoites are produced. They now bring evidence to prove that the action of atebrin is of the same kind. BECKMAN (p. 439) obtained similar results in that he noted, after treatment with atebrin,

that the proportion of small parasites in the blood was greatly increased. This he attributes to retardation of growth.

SCHULEMANN (p. 743) has followed the development of inoculated sporozoites of *P. cathemerium*; they divide in the tissues, but extracellularly, into two uninucleate rounded bodies, but certain other forms are seen which apparently develop irregularly.

BROOKE (p. 742) failed to induce infection in birds inoculated with sporozoites from oöcysts of *P. cathemerium* and *P. relictum*. He deduces that the sporozoites are probably not infective until they have escaped from the oöcyst.

COULSTON and MANWELL (p. 440) have induced infections from a single parasite of *P. circumflexum*. These infections are slight, but from birds so infected severe attacks may be induced in others by sub-inoculation. Exoerythrocytic schizonts are not found in the slight infections but are regularly found in the severe cases; it seems certain, therefore, that these forms can originate from the pigmented stages in red blood cells, and that they develop when the defence mechanism is at some disadvantage. [See CORRADETTI above.]

TRAGER (p. 440) has examined the viability of *P. lophurae* in a fluid medium maintained at 39·5–42°C. Survival was increased by aeration and by optimal additions of serum, glucose or other substances, and infectivity was maintained up to the sixth day. There was evidence that the parasites multiplied on the first day.

He (p. 441) quotes evidence which indicates that blockage of the lymphoid-macrophage system by intraperitoneal injections of carbon ink interferes with the development of acquired immunity of chicks against *P. lophurae*, but notes that when the ink is injected into the heart there is no such interference although the blockage of the lymphoid-macrophage system is more complete.

WALKER and VAN DYKE (p. 441) have found that sulphathiazole, sulphadiazine and, to a smaller extent, sulphanilamide, are effective against *P. lophurae* infections of ducks. *Charles Wilcocks.*

MALARIA.

SIMMONS (James Stevens). **Progress in the Army's Fight against Malaria.**—*Jl. Amer. Med. Assoc.* 1942. Sept. 5. Vol. 120. No. 1. pp. 30–34. With 5 figs.

This lecture gives an interesting historical account of the importance of malaria as a cause of morbidity and death in the armed forces of the United States, from early times up to the present. From 1819 to 1880, the period of clinical recognition of the disease, the hospital admission rates for malaria of white troops per 1,000 in the United States ranged from 200 to about 1,000 a year; the disease occurred in all sections of the States but was most prevalent in the South. During the subsequent 20 years, "the period of etiologic knowledge," there was a marked decline in malaria incidence, from about 200 to 100, and the malaria mortality rate fell from 0·56 per 1,000 in 1880 to 0·2 in 1898. The improvement was largely due to civic improvement in communities near Army garrisons. In many posts the rates remained very high, a large proportion of the troops being infected each year. There was a marked increase of malaria incidence as a result of the Spanish

American War. There has been great progress in the control of malaria in the American Army since the beginning of the century, that is, since the discovery of mosquito transmission. The hospital admission rates for malaria for all white troops in the Army, regardless of location, were 392, 254 and 183 per 1,000 in 1901, 1902 and 1903. Since the last war the highest rate has been 10·9 in 1921, the lowest 3·8 in 1938 and 1939. An interesting graph illustrates the fall in the malaria admission rates of troops stationed in Panama, the Philippines, and the United States respectively during the present century, a graph which redounds to the credit of the Army Medical Service.

The measures taken to combat the threat of malaria at the present time have been far-reaching. They include the establishment of a Preventive Medicine Service in the Surgeon General's Office, a section of which Service, directed by an eminent malariologist, is devoted entirely to the control of malaria and other tropical diseases. There is also a Commission on Tropical Diseases composed of experts. The Division of Medical Sciences, National Research Council, has formed a Sub-committee on Tropical Diseases which has advised the Army on matters of policy, and has helped in the planning of training programmes and research projects. The Rockefeller Foundation, the American Red Cross, and the Federal and State Health Services have all helped. The intensification of anti-mosquito campaigns in permanent camps kept the annual admission rate for malaria down to 1·7 per 1,000 in 1941 in spite of an enormous increase in the size of the Army. A special health service helped in the selection and sanitation of the Caribbean bases acquired from Great Britain, and did very valuable work.

American armed forces are operating in many parts of the world in which malaria is not the least dreaded enemy that they face. This lecture shows that they will be extremely well equipped for that fight.

Norman White.

SICAULT & MESSERLIN. Extrait du Rapport Annuel sur l'activité du Service Antipaludique en 1939. [**Annual Report of the Malaria Service of Morocco for 1939.**]—*Bull. Inst. Hyg. Maroc.* 1939. July–Dec. No. 3–4. pp. 227–241.

KIKUTH (Walter). Experimentelle Ergebnisse zur Klinik und Therapie der Malaria. [**Experimental Investigation on the Clinical Course and Therapy of Malaria.**]—*Deut. Med. Woch.* 1942. Oct. 16. Vol. 68. No. 42. pp. 1024–1027. With 1 fig.

The paper begins with a brief review of the wide geographical distribution of malaria and of its influence during war. Kikuth then points out that when the life-cycle of the malaria parasite had been worked out no less a person than KOCH hoped that by thorough treatment with quinine it would prove possible to make whole communities parasite-free and thus, by preventing the infection of the mosquito, to combat the disease. Unfortunately, however, this hypothesis turned out to be fallacious. Quinine controlled the acute attack, thereby reducing the mortality of the disease, but the morbidity remained unchanged and relapses, especially in simple tertian malaria, were not prevented. Furthermore, it was soon discovered that quinine had no effect on the gametocytes of malignant tertian malaria and, accordingly, infection of mosquitoes was not prevented by the drug in this disease.

The explanation of the occurrence of relapses remained unsolved as the theory that the gametocytes changed into asexual forms could not be accepted. The so-called spring relapses in Holland, Macedonia and Russia remained a special enigma. These relapses occurred at the same time as new cases at the beginning of spring before the adult mosquitoes had begun to swarm ; they could not be due to mosquitoes which had hibernated and these do not remain infective throughout the winter, the sporozoites degenerating after some weeks or months.

KORTEWEG was the first to draw attention to the long latency of the first infection and the spring relapse, and to trace it back to an infection occurring in the preceding late summer. Further experimental work showed that the season of the year had nothing to do with the matter, but that the late relapses and the cases with long latency developed on an average in about nine months after infection.

This was broadly the position of knowledge at the end of the last world war. Experience has shown that quinine is no true causal prophylactic, but that it controls the infection. After the termination of the war two great German discoveries were made, *viz.*, the malaria therapy of general paralytics by WAGNER-JAUREGG, and the production of the synthetic antimalarials, plasmoquine and atebrin. The former discovery afforded great opportunities for studying malaria. Wagner-Jauregg's method consisted in infecting the paralytics with blood containing the asexual forms of the parasite. Two facts stood out in this work, *viz.*, the severity of the artificially induced disease and the ease with which it could be permanently cured with small doses of quinine. The difference in the course of the induced and natural infections was further demonstrated in a convincing manner when British investigators introduced the method of infecting the paralytics by means of sporozoites. YORKE and MACFIE (1924–25) made a very interesting observation which was of considerable significance for further investigation of the developmental cycle of the malaria parasite. They showed that quinine given during the incubation period was inactive in sporozoite infections, whereas in blood infections it prevented the development of the disease.

Then came the discovery of the two new synthetic antimalarial substances, plasmoquine and atebrin. Atebrin acts on the asexual forms of all the malaria parasites, but as a causal prophylactic it is just as inactive as quinine. Plasmoquine proved to be an antimalarial substance of quite a new kind, in that it destroyed the crescents in malignant tertian malaria. It also exhibited another property, in that it lessened the relapse rate in simple tertian malaria. JAMES and his colleagues showed that plasmoquine in daily doses of 0·06 gm. on six successive days inhibited the development of the infection in mosquito-induced simple tertian and malignant tertian malaria. This observation was peculiar in that plasmoquine has no action on the schizonts of malignant tertian malaria. Unfortunately, however, these large doses of plasmoquine were not entirely harmless, and consequently at the present time, notwithstanding its definite prophylactic action, causal prophylaxis is still impossible.

It was whilst he was concerned with this problem that James advanced the hypothesis that the sporozoites in certain circumstances underwent a development in the cells of the connective tissue or endothelium before they reached the circulation and entered the red blood cells. This hypothesis was also reached about the same time by

Kikuth and other investigators; and in 1934, RAFFAELE and, independently, the Americans HUFF and BLOOM, succeeded in demonstrating such forms in *Plasmodium elongatum* of birds. Shortly afterwards, KIKUTH and MUDROW demonstrated the existence of similar forms in the endothelial cells in *P. cathemerium* infections. The significance of these forms, which were designated "E" forms by Kikuth and Mudrow, remained unsettled for a considerable time. Subsequent work by Kikuth and Mudrow has now shown that the sporozoites in the vertebrate host undergo an initial development in the reticulo-endothelium. The paper is illustrated by a diagram depicting the author's conception of the developmental cycle of a bird Plasmodium. The sporozoites enter the reticulo-endothelium and there undergo cyclo-multiplication, producing the "E" forms. From this cycle forms are given off which enter the red cell and produce the cycle of schizogony. From this cycle of schizogony gametes arise which in turn infect the mosquito. Whilst this transmission from the endothelial cycle to the erythrocyte cycle apparently occurs in all species, the return from the erythrocyte cycle to the endothelial cycle has been demonstrated definitely in only two species.

It is assumed that this scheme of development holds not only for bird malaria but also that a similar development occurs in man. Indeed, Raffaele claims to have found such developmental forms in all three species of human malaria. According to this theory, the "E" stages represent the first developmental phase of the malaria parasite in the vertebrate host, and the pigment-containing blood forms arise from them. The "E" forms can outlast for a greater or lesser length of time the early phase of the infection and can always give rise again to blood infection. These facts, on theoretical grounds at least, will explain the relapses, and BASTIANELLI sees in the "E" stages the cause of the late relapses. Experiments on bird malaria have shown that no known antimalarial drug has an action on the "E" stages, with the single exception of plasmoquine which has a certain amount of action. As in human malaria the behaviour of the parasite is probably similar, there is a possibility of relapse when the parasites in the blood have been destroyed by medication. It is conceivable that the "E" forms may be influenced by immune bodies developing in the organism and that when these immune bodies gain the upper hand the "E" bodies in their secret hiding place may be destroyed, and permanent cure result. The goal for further investigation would seem to be the discovery of a causal prophylactic, either against the sporozoite itself or against the "E" stages arising from the sporozoite. *W. Yorke.*

CASINI (G.). Notizie e rilievi sull'epidemiologia della malaria in Albania fino al 1939–40. [**Notes on the Epidemiology of Malaria in Albania to 1939–40.**]—*Riv. di Malariologia.* Sez. I. 1941. Vol. 20. pp. 75–115. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Dec. Vol. 30. Pt. 12. p. 177.]

A survey is given of the geography and climate of Albania and the condition of the people in relation to disease, and work in the country in 1928–39 is described. Malaria is widespread, particularly along the coast and the rivers and mountain streams up to an altitude of about 3,600 ft. The most important vectors are *Anopheles maculipennis* var. *sacharovi*, Favr. (*elutus*, Edw.) along the coast and *A. superpictus*,

Grassi, inland, *A. maculipennis* var. *typicus* being less dangerous. *Plasmodium vivax* and *P. falciparum* predominate, while *P. malariae* is much rarer.

COLUZZI (A.). L'endemia malarica a Valona. [**Endemic Malaria in Valona.**]—*Riv. di Malariologia.* Sez. I. 1941. Vol. 20. pp. 116–157. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Dec. Vol. 30. Pt. 12. p. 177.]

In the Valona district of Albania, the most important vector of malaria is *Anopheles maculipennis* var. *sacharovi*, Favr. (*elutus*, Edw.). It becomes active in May and is commonest at the end of June and beginning of July. Malaria is endemic in all areas below an altitude of about 1,600 ft.

PELAZZI (A.). L'endemia malarica a Durazzo. [**Endemic Malaria at Durazzo.**]—*Riv. di Malariologia.* Sez. I. 1941. Vol. 20. pp. 158–186. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Dec. Vol. 30. Pt. 12. p. 177.]

Observations in June–November 1940 showed that *Anopheles maculipennis* var. *sacharovi*, Favr. (*elutus*, Edw.) is the most important vector of indigenous malaria in the district round Durazzo in Albania. The disease reached its peak in August–October, and in these months *Plasmodium falciparum* was more prevalent than *P. vivax* or *P. malariae*.

SALITERNIK (Z.). **The Macroscopic Differentiation of Anopheline Eggs according to their Pattern on the Surface of Water.**—*Bull. Entom. Res.* 1942. Dec. Vol. 33. Pt. 4. p. 221. With 1 plate.

The nine species of Anopheles occurring in Palestine, in their order of frequency, are *A. maculipennis* var. *sacharovi* (*elutus*), *superpictus*, *sergenti*, *multicolor*, *claviger*, *algeriensis*, *hyrcanus*, *pharoensis* and *coustani*. The author has observed that the eggs of *sacharovi*, *superpictus* and *multicolor* arrange themselves in parallel patterns on the water surface; the eggs of the first two appearing to the naked eye to have a space between adjacent eggs, while those of *multicolor* are so close together that they resemble long ribbons. The eggs of the other species are arranged in angular patterns, stars, etc. The autumn eggs of *sacharovi*, which have small floats, also assume the star form; but they are readily recognized by their ash-grey colour. A series of photomicrographs shows examples of the egg patterns of all nine species. *V. B. Wigglesworth.*

SKOPIN (I. G.). **Data on the Phenology of *Anopheles* in Kazakistan.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1942. Vol. 11. No. 3. pp. 21–30. [In Russian.]

The author presents a solid body of fact relating to dates at which certain events happen in the life-history of *Anopheles maculipennis* in Kazakistan.

The facts were collected at Chimkent, Omsk, in the Tian Shan and Altai regions and at other spots less well known to us. For each place the author gives the date of emergence of females from hibernation,

also dates on which eggs and larval instars were observed, and on which the first adults of the next generation emerged from the water. He also gives information about the dates at which aquatic stages ceased to be observed in the autumn. As his primary object is to define the period over which control of the breeding places should be exercised, he bases his figures on observations made in the warmest of three consecutive years.

The details, which are set out fully, are mainly of local interest. It seems that in different parts of the area, females begin to emerge from hibernation from the end of February to the middle of April and it is recommended that control of waters should start between early April and early May in different places. A point of some interest is that adults leave their hibernating quarters when the temperature is still very low. For all the localities the earliest emergence took place when the mean temperature of the 10-day period was between 0 and 4°C. and emergence from hibernation was finished when the temperature was 8–12°C. One should, however, note that it is not stated whether the temperatures were taken in the places of hibernation or in the open, and whether they are based on maxima or minima, or how the means are arrived at.

The author does not state the race of *A. maculipennis* on which he worked, nor whether several races occurred in the locality. He gives a small amount of information relating to *A. bifurcatus*.

P. A. Buxton.

LEWIS (D. J.). **A Northern Record of** *Anopheles gambiae* **Giles (Dipt., Culicidae).**—*Proc. Roy. Entom. Soc. London.* Ser. B. Taxonomy. 1942. Sept. 15. Vol. 11. Pt. 9. pp. 141–142.

The author records the discovery of *Anopheles gambiae* a very few miles north of Wadi Halfa. The locality is within the boundary of the Anglo-Egyptian Sudan, but extremely close to that of Egypt. This record extends the known range of this insect towards the north.

P. A. Buxton.

RUSSELL (Paul F.) & RAO (T. Ramachandra). **Observations on Longevity of** *Anopheles culicifacies* **Imagines.**—*Amer. Jl. Trop. Med.* 1942. Sept. Vol. 22. No. 5. pp. 517–533. With 2 figs. & 3 charts. [23 refs.]

Experiments were carried out in a large outdoor screened insectary at Pattukkottai, South India, in which conditions were sufficiently normal for breeding to take place and in which climatic conditions were similar to the natural conditions outside. Some ten thousand newly emerged adult mosquitoes (*Anopheles culicifacies*), after dusting with printers' ink powder of various colours, were released from May to October and recaptured at frequent intervals. A calf was present for the feeding of the females; fruit, syrup and flowers for the males. The maximum longevity of females varied from 8 to 34 days, being longest at the season of slightly lower temperatures and considerably higher humidity. The longest period a male was observed to live was eight days. The numbers always fell off very rapidly, at least 50 per cent. of the mosquitoes released dying by the third day. The probable duration of life was only two days; the average life span only four days; but in each batch there were always one or two individuals which lived much longer than the rest. *V. B. Wigglesworth.*

RUSSELL (Paul F.) & RAO (T. Ramachandra). **A Study of Density of *Anopheles culicifacies* in Relation to Malaria Endemicity.**—*Amer. Jl. Trop. Med.* 1942. Sept. Vol. 22. No. 5. pp. 535–558. With 5 figs. [22 refs.]

Over a period of two years the authors have carried out comparative studies in eight south Indian villages; four in the malarious Pattukkottai taluk and four in the contiguous non-malarious Tanjore delta. In both areas *Anopheles culicifacies* was present, and no differences could be detected in morphology, ecology, behaviour or susceptibility to experimental infection by human plasmodia. But standardized collections by the same workers in human and animal dwellings and in traps of uniform structure, expressed on a basis of mosquitoes per man hour, indicated that the density of *A. culicifacies* was three to four times greater in the taluk than in the delta. They therefore conclude that the density of the vector is the chief factor in this example of "anophelism without malaria." These observations bear out the assumptions of ROSS and others that there must be a "critical density" of an anopheline carrier of malaria, below which no transmission of the disease will occur. The difference in the abundance of *A. culicifacies* in the two areas was clearly related to the numbers of available breeding places. Waste fallow lands with pools of irrigation water, fallow rice fields, and borrow pits were far more plentiful in Pattukkottai than in the delta. *V. B. Wigglesworth.*

AMARAL (Juarez). Infecção natural de Nissorhynchus Kerteszia especies cruzi e bellator (diptera, culicidae). Nota prévia. [**Natural Infection of *A. cruzi* and *A. bellator* with Malaria.**]—*Folha Med.* 1942. Aug. 5. Vol. 23. No. 15. p. 171.

The author has examined 444 specimens of *A. cruzi* and 307 of *A. bellator* in the coastal region of Paraná; of the former two, and of the latter one, were found to contain oöcysts. It is not certain that they can transmit the infection, and proof must wait on the finding of sporozoites. The author notes that his findings were made in a region in which intensive therapy had been practised. *C. W.*

PEREZ ACOSTA (Francisco). El paludismo. Su influencia en la evolución clínica de la gestación y el puerperio. [**The Influence of Malaria in the Clinical Evolution of Gestation and the Puerperium.**]—*Rev. Méd.-Quirúrg. de Oriente.* Santiago de Cuba. 1942. June. Vol. 3. No. 2. pp. 78–85.

This paper stresses the importance of malaria to the obstetrician practising in a country where malaria is endemic, and is based on the notes of 113 patients infected with *P. falciparum* and 30 with *P. vivax*, who were admitted to the maternity wards of a hospital during four years. During the early months of gestation malaria may be present in an insidious form, and may therefore be overlooked. Abortion caused by malaria is more frequent in the fourth to sixth months of gestation than in the first three months. During the last three months malaria may cause premature birth. In all pregnant women malaria calls for prompt treatment. Malarial eclampsia is not rare; convulsions always indicate the necessity for a blood examination, as does any febrile manifestation during the puerperium.

Norman White.

NAIDU (V. R.), RAO (A. Vasudeva) & RAJAGOPAL (M. D.). **Modified Malaria Flocculation Test.**—*Jl. Indian Med. Assoc.* 1942. Aug. Vol. 11. No. 11. pp. 340–342.

The authors have used for many years the flocculation of serum in distilled water as a test for malaria infection. When no parasites are found in the blood the test is of value. Negative results are significant. An accidental contamination of the distilled water with ethyl alcohol led to the observation that the alcohol had added to the sensitiveness of the test. The solution now used is made by adding 1·5 cc. absolute alcohol to 8·5 cc. freshly distilled water. The test thus carried out is appreciably more sensitive and only slightly less specific than when distilled water alone is used. *Norman White.*

SCIENCE. 1942. Oct. 16. Vol. 96. No. 2494. Supp. pp. 10–11.—**New Standards adopted for Totaquine.**

This is a note to record that Dr. E. F. COOK has reported that new standards will shortly be announced in the U. S. Pharmacopoeia. Lowering the quinine content to 7 per cent. allows fuller use of South American barks. The former standard for totaquine required 10 per cent. or more of quinine, but an upper limit of 12 per cent. will now be made, so that results of treatment will be more uniform. The former requirement that at least one-quarter of the product be cinchonidine and cinchonine will be completely dropped, and the lower limit of 70 per cent. total crystallizable alkaloids will now be supplemented by an upper limit of 80 per cent.

At a recent conference on tropical diseases the general opinion was that totaquine is equal to quinine in the treatment of malaria.

C. W.

PELNER (Louis) & SASKIN (Edward). **Toxic Amaurosis due to Quinine. Treatment with Sodium Nitrite Administered Intravenously.**—*Jl. Amer. Med. Assoc.* 1942. Aug. 8. Vol. 119. No. 15. pp. 1175–1176. [10 refs.]

A Negro woman, aged 69, suffered from malaria; quinine sulphate, 5 grains three times a day, was given. When she had taken nine doses (45 grains in all) she became totally blind. The pupils were dilated and did not react to light. Examination of the fundi disclosed a condition simulating bilateral occlusion of the central artery. A large area of oedema extended from each optic papilla, outwards, above and below the macula, and beyond it for a distance of about 1 disc diameter. A cherry-red spot was seen in each macula. The retinal arteries were contracted, the veins somewhat dilated. Prostigmine methylsulphate (1 : 2,000) 2 cc. was given hypodermically and 1 grain of sodium nitrite every two hours by mouth; there was no apparent effect. Accordingly, 1 cc. of sodium nitrite solution was given intravenously; this was repeated after four hours. There were almost immediate signs of returning vision. Two further injections of sodium nitrite were administered. A 2 per cent. solution of ethylmorphine hydrochloride, 1 drop in each eye three times a day was also prescribed. Tablets of vitamin B complex were given on account of the effect it is supposed to have in protecting nerve structures. The response to the nitrite injections was dramatic. Sight was recovered, but there was an almost concentric, 10 to 15 degrees, residual contraction in the visual field of each eye. *Norman White.*

GEORGEVIC (Ivan). Ueber sog. larvierte Malaria und ueber Tertianabehandlung. [**On the So-called Larval (Masked) Malaria and on the Treatment of Simple Tertian Malaria.**]—*Deut. Trop. Ztschr.* 1942. Sept. 1. Vol. 46. No. 17. pp. 433–438.

This form of malaria easily escapes notice because it is very difficult to recognize and a diagnosis during the latent period can be made only by exclusion. This means that in a patient who has once had malaria all other diseases with similar symptoms must be excluded before a diagnosis of larval or masked malaria can be reached. This type of malaria is usually seen in Croatia during the cold season between the middle of November and the beginning of April. In the spring it is apt to break out into an acute attack. Diagnosis is especially difficult in children because there is nothing characteristic about the blood picture. One must not be misled by hereditary syphilis, chronic gastric or intestinal catarrh, acetonaemia, leukaemia and chronic pneumonia. This necessitates all sorts of elaborate and tedious examinations. The author develops this point and illustrates it by a case which came under his own observation.

Larval (masked) malaria is so resistant to quinine and atebrin that the slight temperature—about 37·2°C.—which is frequent in such cases is uninfluenced by these drugs. Only plasmoquine in combination with quinine (quino-plasmoquine) will cause the temperature to become normal. The conclusions reached in the first portion of the paper are :—

(1) The diagnosis of larval (masked) malaria during the latent period is a tedious matter, and can only be reached by means of exclusion.

(2) It is in the latent period very obstinate and is best treated by quino-plasmoquine, and residence in high mountains.

The next part of the paper deals with points which require attention in the treatment of simple tertian malaria. It is necessary to differentiate between children and adults. In the author's country almost all doctors treat malaria in children with quinine tannate, notwithstanding the fact that it is difficult to control even the first attack with this preparation. The author believes that quinine tannate does more harm than good because the malaria parasite is more easily made quinine-resistant by it than by other quinine preparations. [No evidence is produced to support this remarkable statement. So far as the reviewer is aware there is no evidence that the malaria parasites ever become quinine-resistant ; this may occur but the proof is lacking.] If children cannot take quinine hydrochloride or atebrin by the mouth it is better to abandon oral treatment than to use quinine tannate. Georgevic recommends atebrin injections followed by quinine hydrochloride suppositories and during this course of treatment three injections of myosalvarsan.

For adults it is customary to give four tablets of atebrin (*i.e.* 0·4 gm.) daily as this large dosage considerably reduces the number of relapses. If atebrin is not available, large doses of quinine should be accompanied by injections of neosalvarsan ; as an after-treatment, quino-plasmoquine is always given. In patients who first come under treatment after they have had several paroxysms, the best results are obtained by such energetic treatment ; with the atebrin treatment the relapses are reduced to 8 per cent. and with the quinine-neosalvarsan treatment to 25 per cent. *W. Yorke.*

HÜHNE (Wolfgang). Ueber Atebrineinwirkungen auf das morphologische Verhalten von *Plasmodium falciparum.* [**The Morphological Changes in** *Plasmodium falciparum* **under the Influence of Atebrin.**]—*Deut. Trop. Ztschr.* 1942. Aug. 1. Vol. 46. No. 15. pp. 385–389. With 9 figs.

Reference is made to earlier work of BOCK and others on this subject [this *Bulletin*, 1939, Vol. 36, p. 924]. The author had the opportunity of studying the changes produced by atebrin in a number of pernicious cases of malignant tertian malaria in Greece. The changes were observed in Giemsa-stained preparations of the blood, and are illustrated by a number of microphotographs. The author gives the following summary of the changes which he observed and which he believes were due to the action of atebrin :—

(1) Swelling of the cytoplasm of young ring-forms.

(2) Separation of the nuclei of the young ring-forms from the wall of the ring. The nucleus appears as a separate body within the ring.

(3) Complete destruction of the cytoplasm of the young ring-forms, only the nucleus being left visible in the erythrocytes.

(4) Swelling of the cytoplasm of the half-grown forms and the appearance of pigment in the cytoplasm ; simultaneous swelling of the chromatin.

(5) Fragmentation and destruction of the chromatin ; massing of pigment on the periphery of the cytoplasm.

(6) The cytoplasm of the half-grown forms becomes completely altered ; vacuolation sets in and at times is seen in most pronounced degree. *W. Yorke.*

AGUILAR MEZA (R.), GONZÁLEZ (E.) & MEDRANO (A. R.). Estudio comparado de la certuna, la plasmoquina, la atebrina y la quinina como gametocidas. [**Comparative Study of Certuna, Plasmoquine, Atebrin and Quinine as Gametocides.**]—*Bol. Oficina Sanitaria Panamericana.* 1942. June. Vol. 21. No. 6. pp. 549–554. English summary.

The title of this paper is not apt. There is very little information of value regarding the relative gametocidal value of the four drugs mentioned, but there is a good deal about the prevalence of malaria in a part of Guatemala and about the measures that have been taken in recent years to decrease the prevalence. In 1934 and 1935–36, 11,012 and 23,000 blood examinations were made in the rural areas of Quirigua. Those harbouring parasites, 1,565 and 3,830 respectively, were treated with quinine and plasmoquine. Since 1939 certuna has been used instead of plasmoquine in a number of cases. Gametes disappear somewhat more rapidly with certuna than with plasmoquine ; the dose of the former drug given was generally 0·02 gm. three times a day, for five days, for adults. A small amount of anti-larval work has been done and flit atomizer pumps have been used with good results. Among the personnel of farms belonging to the Compañia Agricola of Guatemala, parasite rates were 15·2 per cent. in 1938, 6·8 in 1939 and 7·9 in 1940. *P. falciparum* infections are most in evidence ; *P. vivax* is common, *P. malariae* is relatively rare. *A. albimanus* and *A. punctipennis* are the two most important vectors. *Norman White.*

DAVID (W. A. L.). **The Utilisation of Waste Lubricating Oil in Mosquito Larvicides.**—*Bull. Entom. Res.* 1942. Dec. Vol. 33. Pt. 4. pp. 235–240.

The author has re-investigated the problem of using waste lubricating oils as constituents for mosquito larvicides. In the past most workers have attempted to use such oils diluted with kerosene alone, usually with unsatisfactory results [see this *Bulletin*, 1942, Vol. 39, p. 396]. Recent work on the blending of larvicidal oils has indicated that a suitable mixture should cover a wide distillation range and in this paper the author shows that by combining 10–30 per cent. of waste oil with 10–20 per cent. of kerosene and 60–75 per cent. of diesel oil, it is possible to obtain a mixture with suitable spreading pressure and film stability combined with adequate toxicity. Waste oils vary widely in character; the author used nine samples obtained from various Army and R.A.F. depots. It is therefore not possible to lay down any standard mixture. Satisfactory proportions can only be arrived at by experiment along the lines already described [see this *Bulletin*, 1943, Vol. 40, p. 16.] *V. B. Wigglesworth.*

HILL (Claire McDowell). **Anemia as a Cause of Death in Bird Malaria.**—*Amer. Jl. Hyg.* 1942. Sept. Vol. 36. No. 2. pp. 143–146. With 2 figs.

The daily examination of the blood of eight pigeons which died of *Plasmodium relictum* infection experimentally induced, has indicated that anaemia resulting from a reduction in the number of erythrocytes may be regarded as the immediate cause of death.

C. M. Wenyon.

TRYPANOSOMIASIS.

LEWIS (E. A.). **Tsetse-Flies and Development in Kenya Colony. Part I.**—*East African Agric. Jl.* 1942. Vol. 7. pp. 183–189. [Summary taken from *Vet. Bull.* 1943. Jan. Vol. 13. No. 1. p. 20. Initialled U. F. R.]

An account is given of the species of tsetse flies occurring in Kenya colony, their distribution, breeding and feeding habits, and their influence on soil erosion and agriculture. It is pointed out that fly belts are zones of different dimensions, irregular in shape, with localities that are either fly-free or only occasionally infested, and that tsetses have their permanent haunts from which they disperse when conditions outside are favourable, and to which they return in adverse seasons. A complete tsetse survey has never been undertaken systematically in Kenya, but there is evidence that fly encroachment has occurred, and that this advance has forced the people into more and more congested areas.

It has been suggested that tsetse flies have saved much of Africa from soil erosion by preventing the maintenance of an excessive stock population, but that in other areas they have contributed to soil erosion by causing congestion of human beings and stock. It is argued that the view which accepts an injurious pest in the guise of a protector

of the country favours the surrender of trusteeship to an agency which hinders development and which is continually threatening to take possession of additional land. Modern thought tends to favour attempts to bring more land into use, by controlled cultivation and clearing to restrict tsetse-infested areas, and even to free them from fly, so that stock can be reintroduced into them.

LEWIS (E. A.). **Tsetse-Flies and Development in Kenya Colony. Part II.**—*East African Agric. Jl.* 1942. Vol. 8. pp. 9–14. [Summary taken from *Vet. Bull.* 1943. Mar. Vol. 13. No. 3. p. 94. Signed U. F. RICHARDSON.]

Increase in stock in Kenya colony, due to control of the major diseases, has led to an overcrowding of stock in areas not infested by tsetse and an excessive use of watering places free from fly, with the production of soil erosion, whilst stock kept on the fringes of fly belts suffers periodic losses from trypanosomiasis. Fly distribution is still imperfectly known and some confusion has been caused by recording areas as fly-infested, because animal trypanosomiasis has occurred. Where isolated outbreaks of trypanosomiasis occur they may be due to infection contracted outside the area, but when reucrrent outbreaks occur, careful search usually reveals tsetse infestation. The fly belts are not uniformly infested and areas occur in them where stock can be kept, whilst it appears that stock traders know of routes through such areas which can be used with reasonable safety at certain seasons. The majority of tsetse species are dependent on water, *G. swynnertoni* and *G. longipennis* less so than other species ; most of the large rivers in the colony harbour one or more species of tsetse, whilst some species are able to establish themselves near isolated waterholes, so that non-infested watering places for stock are restricted, and require development.

There is not much concrete evidence of unaided spread of tsetse in Kenya except for seasonal dispersals, but spread may occur by the flies following cattle, and being carried by road traffic or trains. The alignment of roads for the development of the colony must be so arranged that the tsetse fly situation is not aggravated. Central control of anti-fly measures is required as otherwise the expense falls on occupiers of land bordering fly areas, who may already be impoverished by losses from trypanosomiasis.

Methods of control consist of evacuating infested areas, clearing of bush (particularly in order to free watering places and road crossings from fly and to attack dry season areas of fly concentration), destruction of wild mammals, and trapping.

DUBOIS (A.) & KOHN (I.). Interférence thérapeutique entre le bleu de méthylène et l'arsénobenzène chez des animaux infectés de trypanosomes. [**Chemotherapeutic Interference between Methylene Blue and Neoarsphenamine in Animals Infected with Trypanosomes.**]—*Ann. Soc. Belge de Méd. Trop.* 1940. Sept. 30. Vol. 20. No. 3. pp. 257–263.

The authors refer to the paper by JANCSÓ & JANCSÓ [this *Bulletin*, 1937, Vol. 34, p. 129] which showed that the trypanocidal action of trivalent arsenicals could be diminished by the simultaneous administration of compounds with a medium redox potential, *e.g.*, toluidine blue. This had been confirmed by the authors [this *Bulletin*, 1940,

Vol. 37, p. 410], and the present paper describes further experiments on the same lines. They find that if mice infected with trypanosomes are treated subcutaneously with neoarsphenamine, 0·5 mgm. per 20 gm., the trypanosomes disappear from the blood in two hours. However, if the mice receive one hour previously a dose of methylene blue, 1 mgm. per 20 gm., the time required for sterilization is lengthened to 5 hours. Among other substances which were tested, ascorbic acid and cysteine were not active in this respect, toluidine blue appeared less active than methylene blue, while azur I was as effective as the latter. This effect cannot be ascribed to a stimulation of the host's metabolism, since it is not produced by thyroxin. [The authors' data do not permit any further analysis of the phenomenon which they describe.] *F. Hawking.*

LEISHMANIASIS.

MIRZOIAN (N. A.) Sur l'affection primaire dans la leishmaniose viscerale des enfants. [**On the Primary Lesion of Visceral Leishmaniasis in Children.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1941. Vol. 10. No. 1. [In Russian pp. 101–106. With 2 figs. French summary p. 106.]

Having discovered papules containing leishmania on the face of an infant who subsequently developed kala azar, and suspecting them to be the primary lesions of this disease, the author decided to investigate the question further. In the present paper are described the results of observations on 80 children, carried out in course of two years in Samarkand (Central Asia). It would appear that several months before the disease can be diagnosed clinically the earliest symptom in children is manifested in the form of one or more minute papules, about the size of a pin-head, appearing on the face. They increase to the size of a lentil, when they are pink or dark red in colour, and disappear several months later, leaving pigmented spots. Scrapings from these papules and spots contain L.D. bodies. Early papules are not associated with palpable cervical glands, but these later increase in size, and subsequently the spleen and other lymph glands also become enlarged.

By the time kala azar is clinically recognizable the parasites may be present simultaneously in the papules and pigmented spots, on the one hand, and in the sternal puncture material, on the other (50 per cent. of cases), or they may have disappeared from the former. The skin lesions are seen best in children under two years of age, with a tender skin and clear complexion. In older children they are more difficult to detect owing to the roughness and pigmentation of their skin.

The possibility of the cases in question representing mixed cutaneous and visceral leishmaniasis is excluded (1) because mixed infections are rare, having been recorded only 13 times from Central Asia, and (2) because the papules never developed into typical oriental sores (except once). The author believes that the papules develop at the site of the bites by infected sandflies for the following reasons: their appearance coincides with the summer-autumn months; they are restricted to the face, which is most exposed to bites; and scrapings taken from other parts of the skin never revealed L.D. bodies.

These are claimed to be the first observations on the diagnostic features of visceral leishmaniasis preceding the appearance of clinical symptoms. In several cases the detection of the primary skin lesions enabled the author to make an early diagnosis of kala azar (in one case six months in advance) in children, and to take them under observation. *C. A. Hoare.*

LATYSHEV (N.) & KRIUKOVA (A.). [**The Present State of the Problem of Cutaneous Leishmaniasis : Pluralism of the Causative Organism.**] —*Med. Parasit. & Parasitic Dis.* Moscow. 1942. Vol. 11. No. 1–2. pp. 74–78. With 2 figs. [In Russian.]

The question regarding the mutual relations between different forms of oriental sore occurring in Turkestan has interested Russian physicians since the end of the last century, when some workers recognized two clinical types of the disease. However, later workers regarded the disease as one, its various manifestations being attributed to differences in the individual reactions of the human host. Recent investigations, carried out independently by the All-Union Institute of Experimental Medicine and the Turkmenistan Dermatologo-Venereological Institute, appear to confirm the earlier views, for they established the existence in Middle Asia of two forms of the disease.

One of these, for which the name Pendeh sore is reserved, is a rural type occurring in the sandy deserts and in native villages. It is a typical zoonosis, since its reservoir hosts are wild rodents (gerbils and marmots) whose burrows serve as breeding places for the sandfly vector [see also this *Bulletin*, 1942, Vol. 39, p. 538; 1943, Vol. 40, p. 24]. The rural disease is seasonal, with a maximum incidence in the aestivo-autumnal period. Its incubation period is about 2–3 weeks, while the duration is only 3–6 months. The rôle of man as the source of infection appears to be insignificant. In this type of disease, which is characterized by an acute course, with rapidly ulcerating, " moist " lesions, parasites are scanty and complications, in the form of lymphangitic nodules, are common. Mice are highly susceptible to infection with the parasites.

The second form, the Ashkhabad sore, is described as the urban type of the disease, since it occurs in towns. In the absence of wild rodents within the area of its distribution man is supposed to be the main source of infection. The incidence of this disease is fairly uniform throughout the year. Its incubation period is prolonged (up to several months) and it persists for upwards of one year (occasionally 10 years). This form of cutaneous leishmaniasis, which is chronic, with retarded papular ulceration, is known as the " dry " type. Parasites are numerous in the lesions and lymphangitic nodules rarely develop. White mice and gerbils become infected with difficulty.

When foci of the " moist " Pendeh sore do occur in townships, they are restricted to the periphery, where the suburbs merge with the desert. That the two types of leishmaniasis are distinct clinical entities, and not the result of variations in the individual susceptibility of the host, was established by experimental inoculation of human beings. It was demonstrated that the course of infection in the recipient invariably corresponded to that in the donor.

The form of cutaneous leishmaniasis found in Transcaucasia appears to be of the " dry " type. *C. A. Hoare.*

DUBOVSKY (P.). **Vaccinotherapy of Cutaneous Leishmaniasis.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1942. Vol. 11. No. 1–2. pp. 69–74. [In Russian.]

The author describes a new method of vaccine treatment against cutaneous leishmaniasis, tested by him in Middle Asia. The vaccine was prepared from cultures of *Leishmania tropica*, 15 strains of which were isolated from human cases. The parasites were grown in a milk medium with rabbit blood (separated milk filtered through linen, distributed in test tubes (6–8 cc.) with 0·5–1 cc. defibrinated rabbit blood), at 20–22°C. Cultures, from 10 to 45 days old, were centrifuged and the precipitate was repeatedly (3–4 times) washed in saline, after which 2–3 cc. saline were added to each tube, the contents mixed and poured into a flask with glass beads. The mixture was then inactivated at 60°C. for 1 hour. The number of parasites in the vaccine (determined by counting in a haemocytometer) varied between one and five million per 1 cc. After testing for sterility and viability the vaccine was distributed in ampoules (without a preservative) which were kept at 37°C. for 7 days. Usually polyvalent vaccines were employed.

The patients comprised 38 cases with lesions from 1½ months to 11 years old, in most of which other methods of treatment had been unsuccessful. A first dose of 0·1 cc. vaccine was introduced intradermally. If it did not produce a severe reaction or complications the dose was gradually increased. After administration of 0·5 cc., subcutaneous injections (up to 20) were made, the total amount of vaccine employed for each patient varying from 5 to 20 cc. The case was considered to be cured after the infiltrate was absorbed and the ulcers were healed. In such cases relapses never occurred. General and temperature reactions were rarely observed after vaccination. In the majority of cases there was a local reaction, lasting 3–5 days, manifested by redness, swelling, pain and increased discharge from the ulcers.

The results of vaccination were as follows: complete cure in 22 (57·9 per cent.), considerable improvement in 7 (18·4 per cent.), slight improvement in 6 (15·8 per cent.), failure in 3 (7·9 per cent.). The negative cases are attributed to insufficient numbers of parasites in the vaccine and to its preparation from old cultures. Conclusions: (1) treatment of oriental sore with leishmanial vaccine succeeded in most cases; (2) the cosmetic effect of treatment was satisfactory; (3) this method of treatment is suitable for out-patients; and (4) the dosage of vaccine should be varied in individual cases. *C. A. Hoare.*

FEVERS OF THE TYPHUS GROUP.

GRACIAN (Miguel). Ein einfaches Verfahren zur Färbung der Rickettsien. [**A Simple Method of staining Rickettsiae.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1942. July 22. Vol. 124. No. 1. pp. 81–82. With 2 figs.

The excellent methods of Castañeda and Machiavello are not suitable when large numbers of slides have to be stained daily. The simple Giemsa method does not differentiate clearly between the organisms

and granular débris. By the method now described the Rickettsiae are deeply stained and show up well against an almost clear background.

(1) The air-dried film, without fixing, is soaked in xylol for 3 minutes ; (in a footnote 10 to 15 minutes treatment with xylol is said to give better results.)

(2) The xylol is drained off, and before the film has dried it is flooded for a few moments with two applications of 96 per cent. alcohol.

(3) The film is at once washed in tap water and then flooded with a saturated solution of bichromate of potash for 3 minutes.

(4) After thorough washing in tap water it is stained for 10 to 20 minutes with Giemsa's stain (two drops in one cc. distilled water)

(5) It is then washed in tap water and dried.

The author has the impression that the Rickettsiae look larger than when stained with Giemsa in the usual way. He suggests that the method is worth trying for other organisms which are faintly stained with Giemsa. He has found it useful for staining spirochaetes contained in blood films. *John W. D. Megaw.*

PATIÑO-CAMARGO (Luis). El tifo exantematico en la hoya del Rio Cauca. [**Exanthematic Typhus in the Valley of the River Cauca (Colombia).**]—*Rev. Facul. de Med.* Bogota. 1942. July. Vol. 11. No. 1. pp. 13–21.

Within 20 months, 1,574 cases of fever with 73 deaths were reported from five towns in the valley of the River Cauca ; the total population of the towns was nearly 110,000 and their altitudes ranged from 1,842 to 2,214 metres. The case-fatality rate varied from 2·27 to 18·09 per cent. in the different localities.

The disease at first was regarded as typhoid fever, but a preliminary investigation of 19 cases yielded 15 positive Weil-Felix reactions to *Proteus OX19* at titres of 1–160 or over. All were negative to the Widal test. In several cases Rickettsiae were isolated from the peritoneum and tunica vaginalis of guineapigs inoculated with the blood of patients. The arthropod vectors and mammalian reservoirs of infection have not yet been determined.

The average duration of the fever was 15 days, the extremes being 8 and 18 days. The onset and termination of the fever were abrupt. There was a generalized rash, extending to the palms and soles ; this and the general clinical features were those of a fever of the typhus group. *John W. D. Megaw.*

BOGENDÖRFER. Beitrag zum Krankheitsbild des Fleckfiebers. [**The Symptomatology of Typhus Fever.**]—*Deut. Militärarzt.* 1942. July. Vol. 7. No. 7. pp. 455–456.

A succinct account is given of the signs and symptoms observed in recent cases of the disease in German soldiers. The rash was often confined to the trunk ; it extended to the limbs in half the cases ; less frequently to the hands and feet. Some 50 per cent. of the patients suffered from bronchitis and about the same proportion had some degree of deafness which might persist during convalescence. The spleen was sometimes palpable, but only in the early stages of the attacks. In one patient a fever with five-day periodicity followed the fall of the temperature ; this was probably a case of mixed infection with typhus and trench fever. The blood pressure was often low,

even in the mild cases; this condition persisted for at least 10 days after the end of the fever; later observations were not made because the patients were transferred from the hospital. Bradycardia was not uncommon in convalescence; this was not due to the effect of digitalis. In a few undoubted cases the Weil-Felix reaction was persistently negative; on the other hand there were cases of fever lasting one or two weeks in which the diagnosis would have been impossible but for the positive reaction. *John W. D. Megaw.*

HOFF (Ferdinand) & VON BRUNN (E.). Krankheitsbild und Differentialdiagnose des Fleckfiebers. [**The Symptomatology and Differential Diagnosis of Typhus.**]—*Wien. Klin. Woch.* 1942. Sept. 11. Vol. 55. No. 37. pp. 721–726. With 3 charts.

Typhus fever now constitutes a real threat to German soldiers and even to the civil population of Germany. No less than 10,000,000 cases are said to have occurred in Russia in the years 1919 and 1920.

The present article contains little that is new: it is based on a thorough study of about 100 cases seen at a hospital attached to a Soviet University.

The incubation period is nearly always between 10 and 14 days. The spleen is often palpable and tender, but only during the first few days. Pronounced remissions are often seen during the period of about 10 days of high fever. The systolic blood pressure is usually low and may be only slightly higher than the diastolic, *e.g.*, $\frac{90}{75}$ or $\frac{80}{60}$. Rapid loss of weight is a special feature of the disease. The Weil-Felix reaction is of great value in diagnosis but occasionally is negative throughout the course of undoubted cases. In one case it was positive soon after the onset, then remained negative till after the crisis, when it became strongly positive. Ambulatory and mild attacks were most frequent in Russians from endemic areas, and in immunized persons, who often had very severe headache without mental disturbance, and a fleeting rash, or none at all. These mild cases closely simulated influenza. Curiously enough the next disease to be mentioned in connexion with differential diagnosis is bacillary dysentery, which often had an onset like that of typhus. The diseases most often confused with typhus are typhoid and paratyphoid fevers. The positive Widal reaction occurring in typhus patients who had been inoculated against typhoid was a source of difficulty; titres of 1–200 or over were seen and titres of 1–50 to 1–100 in patients who had not been inoculated.

The other diseases that may cause difficulty in diagnosis are—epidemic meningitis, sepsis, miliary tuberculosis, trichiniasis, German measles and arsenical drug-eruptions with fever.

John W. D. Megaw.

SCHELLER (Emil). Abgekürzte erfolgreiche Behandlung des Flecktyphus. [**Successful Abortive Treatment of Typhus Fever.**]—*Muench. Med. Woch.* 1942. Oct. 2. Vol. 89. No. 40. pp. 847–848. [10 refs.]

Excellent results are claimed for treatment with "chinifortan," a combination of quinine and sulphanilamide.

The claim is based on experience of 23 cases, of which 15 with specially pronounced apathy and somnolence were treated from the

onset. The fever lasted, on the average, 6·3 days, as compared with two control cases, occurring at the same time, in each of which the fever lasted 13 days, and four earlier cases in which the average duration was 20 days.

The treatment consisted of chinifortan, 2 cc., thrice daily, by intramuscular injection, and two tablets of the same drug by the mouth, thrice daily; the treatment was continued till the end of the fever.

The total daily dose contained 1·05 gramme quinine and 2·1 grammes sulphanilamide.

[The claim would have been more convincing if alternate cases belonging to the same age group had been treated with the drug.]

John W. D. Megaw.

ROTENBURG (S. S.). **On the Clinical Aspects of Tick Fever in the Far East.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1941. Vol. 10. No. 1. pp. 116–121. With 2 charts. [10 refs.] [In Russian.]

The Far Eastern tick fever is not so well known as other types of this disease: its causative organism has not been isolated, and the reservoir hosts and vectors are unknown. The author records clinical observations on 12 cases carried out in 1939 in the Maritime Province (Primorye). All the patients lived in wooded country, the majority (10) having reported bites by ticks. The primary lesion, appearing at the site of the bite, consists of an infiltration with a necrotic centre which persists for 9–20 days. The symptoms are described in detail. The character of the rash (roseolate papular), positive Weil-Felix reaction during the second and third weeks, as well as the epidemiological data (appearance of the disease in summer, in a locality with ticks in abundance), are all characteristic of tick-borne Rickettsial disease, to which the above cases are referred. Though this disease shows points of resemblance with the Siberian tick fever, it was not possible to determine the exact type to which it belongs.

C. A. Hoare.

DE MAGALHÃES (Octavio) & ROCHA (Adyr). Tifo exantemático do Brasil. Papel do cão (*C. familiaris*) na constituição dos fócos da moléstia. [**Exanthematic Typhus [Tick-borne] of Brazil.**]—*Brasil-Medico.* 1942. July 25 & Aug. 1. Vol. 56. Nos. 30 & 31. pp. 355–358; 370–377. [60 refs.]

The domestic dog has already been shown to be a natural reservoir of infection of Brazilian typhus and the blood of dogs has been found to remain infective for a minimum period of 40 days.

The present research deals with the examination of 135 naturally infected dogs from declared foci of the disease in Minas Geraes. Positive Weil-Felix reactions occurred in 79 per cent. of the dogs from urban areas, in 90 per cent. of those from suburban areas and in 97 per cent. of those from the Mataduro municipal area. The tests were made with four strains of Proteus organisms, *OX19*, *OX2*, *OXL* and *OXK*. The highest titre observed for each of the four strains was 1–640 except for one animal in which the titre for *OX19* was 1–1,640 and zero for the other three strains. In most of the dogs with positive reactions all four strains were agglutinated in varying titres. Reactions at high titres of 1–160 and over occurred in 33 dogs against *Proteus OX19*; in 29 against *Pr. OX2*; in 54 against *Pr. OXL*; and in 58 against *Pr. OXK*. Four dogs were inoculated with Rickettsiae of the

disease; in all four the maximum titres against *Pr. OXK* were from 1–80 to 1–160, but no titres exceeding 1–40 were observed against any of the other three strains.

Guineapigs were inoculated with the blood of 31 dogs and the virus was isolated from 12 of these. The general pattern of the Weil-Felix reactions in animals from which the virus was isolated differed in no way from that observed in animals whose blood gave negative results on inoculation. In both sets of animals the titres for each strain of Proteus ranged from zero to 1–640. *John W. D. Megaw.*

MAZZOTTI (Luis) & VARELA (Gerardo). Reacción de Weil-Felix en perros de la ciudad de México. [**The Weil-Felix Reaction in Dogs in Mexico City.**]—Reprinted from *Medicina.* Mexico. 1942. Apr. 10. Vol. 22. No. 409. pp. 135–136.

The Weil-Felix reaction with *Proteus OX19* was positive in titres up to 1 : 80 in 24 of 38 dogs tested. *C. W.*

ARNETH (J.). Periodisches Fieber (Wolhynisches Fieber, Funftagefieber) im Felde. [**Trench Fever (Periodic Fever, Wolhynian Fever, Five-Day Fever) in the Field.**]—*Klin. Woch.* 1942. Nov. 7. Vol. 21. No. 45. pp. 998–999. [18 refs.]

Arneth discusses briefly the leucocyte picture and the treatment of trench fever. Outbreaks have been described recently from several theatres of war: Poland, Russia, Rumania, Italy, France and Belgium.

The blood condition could not be properly investigated in field conditions but the following findings of KERGER are mentioned. By the end of the second week there is leucocytosis with a pronounced Arneth deviation of the neutrophiles to the left. During the fever-free periods the leucocytosis is less pronounced but the deviation to the left is still present. Neutrophile myelocytes appear and there is a great increase in the number of the large mononuclears and large lymphocytes. In one case with a total count of only 7,200 the differential count showed:—small lymphocytes, 15 per cent., large lymphocytes, 41 per cent. and monocytes, 15 per cent. The eosinophiles are often increased, even up to 10 per cent.

In cases with an irregular fever curve the blood picture is often very helpful in diagnosis.

The author insists that a qualitative count ought to be made of the lymphocytes and monocytes and that this will show a more or less pronounced increase in both, especially of the larger forms. He suggests that the recurring attacks of fever may prove to be a fruitful field for further study of the stages of development of the monocytes, which he regards as being developed from the large lymphocytes.

Treatment by sulphonamides, quinine, atebrin and salvarsan has been useless but the author believes that electrocollargol, intravenously, has been useful in cases with fever of the relapsing type. Ultraviolet radiation in full erythema-producing doses relieves the severe neuralgic pains; this treatment is combined with subcutaneous or deep injections of local anaesthetic solutions at the points of nerve tenderness. In field conditions injections of morphia may be needed to control the unbearable shin-bone pains. *John W. D. Megaw.*

DERRICK (E. H.), SMITH (D. J. W.) & BROWN (H. E.). **Studies in the Epidemiology of Q Fever. 9. The Role of the Cow in the Transmission of Human Infection.**—*Australian Jl. Experim. Biol. & Med. Sci.* 1942. June. Vol. 20. Pt. 2. pp. 105–110. With 1 fig.

The incidence of Q fever suggests that cattle play an important part in its transmission. All but three of 34 patients living in rural areas had close contact with cattle. Of the 118 Brisbane patients 112 worked at meat works. In Moreton Island many of the bandicoots and their ticks were found to be infected with Q fever, yet no human cases occurred. The absence of cattle and scrub ticks (*Ixodes holocyclus*) may account for the failure of the disease to attack human beings.

Two healthy calves were inoculated with liver and spleen emulsion from an infected guineapig: both calves had a rise of temperature, but only on the third day, and their illness was very slight. One calf was killed on the fourth day: two guineapigs inoculated with one gramme each of spleen developed obvious Q fever after 10 days. Smaller quantities of spleen and blood caused no reaction. Guineapigs were inoculated daily with blood from the other calf: the only definite response was in one guineapig inoculated with 3 cc. blood drawn on the fourth day after inoculation. The serum of this calf agglutinated *Rickettsia burneti* by the 11th day after inoculation, at a titre of 1–10: between the 13th and 18th days the titre was 1–30. Several thousand larval cattle ticks (*Boophilus annulatus microplus*) were fed continuously on the ears of the calf, beginning from the time of inoculation. By the 20th day a few of the ticks, which had already become adult, were found to be infected, as shown by positive responses of guineapigs inoculated with suspensions made from batches of ticks. Faeces from the collection of ticks were also infective. The offspring of one infected tick were not infective.

Sera of 879 cattle from 16 farms in the endemic area were tested for agglutinins against *R. burneti*: 13 were positive, these came from five farms. The titres ranged from ++ at dilution 1–10 to +++ at 1–30. There was no evidence of previous illness in the reacting cattle.

Human infection may result from—(1) direct attacks by native ticks (*I. holocyclus*), in the absence of cattle; (2) direct infection from the body tissues and fluids of infected cattle; (3) indirect infection from infected cattle by the tissues or excreta of ticks (especially *B. a. microplus* but perhaps also *Haemaphysalis bispinosa*). The third is probably the most important method of transmission. Inhalation of dried faecal dust of the ticks is a possibility.

The conclusion is that the cow probably plays an important part in the transmission of Q fever to man. *John W. D. Megaw.*

BARTONELLOSIS.

BRUMPT (E.) & BRUMPT (L.-Ch.). VI. Etude épidémiologique concernant l'apparition de la verruga du Pérou en Colombie. [**VI. An Epidemiological Study of the Appearance of the Verruga of Peru in Colombia.**]—*Ann. Parasit. Humaine et Comparée.* 1942. Vol. 19. No. 1–2–3. pp. 1–50. With 4 figs. & 5 plates. [Bibliography.]

The authors give a detailed account of their observations made during a ten-day visit to the epidemic zone of Bartonellosis in the

Department of Nariño in Colombia in September 1939. The epidemic began in Nariño in 1936, but its true nature was not discovered until early in 1939, when a commission sent by the Colombian Government established the diagnosis. [See this *Bulletin*, 1940, Vol. 37, pp. 271, 582–84 ; 1941, Vol. 38, p. 209.] Finding numerous active cases of the disease still occurring, Professor Brumpt and his son were able to confirm the diagnosis by examination of blood smears, autopsy material, and inoculation of rhesus monkeys. Among the Phlebotomus collected in the region and taken back to Paris for classification were found specimens of five different species, two of which had not previously been described.

A large part of this report is taken up with a review of the literature on Bartonellosis and a discussion of the possible origins of the Colombian epidemic. It is concluded that the disease is a new one in Nariño and that the original infection probably came from Peru, arising possibly from contact between Colombian and Peruvian soldiers along the Putumayo in 1932–34.

The possibilities for prevention of spread of the disease are briefly outlined, but appear to offer little hope of success in the present state of our knowledge of the epidemiology. The authors make recommendations for future field and laboratory studies which, in their view, may yield fruitful results. A number of excellent photographs are included, which illustrate clearly the appearance of verrugae, both in man and in rhesus monkeys, the types of people living in the epidemic area, and the precipitous nature of the valleys in the infected region. *Hugh H. Smith.*

YELLOW FEVER.

Smith (E. C.) & Howie (J. W.). **A Yellow Fever Protection-Test Survey of One Hundred African Children in Ibadan, Nigeria.**—*Ann. Trop. Med. & Parasit.* 1942. Dec. 31. Vol. 36. No. 4. pp. 176–178.

The authors, during 1941, examined sera from 100 African children under 12 years of age, by means of the mouse protection test. Four mice were used for each test and when all or three were alive and well on the 10th day, the test was regarded as positive ; the survival of two was considered as partial protection, and all other results as negative.

Of the 100 examined, all natives of Ibadan, 11 gave full protection and nine partial protection and their ages ranged from 5½ to 11½ years. This finding indicates a considerable fall when compared with the 42 per cent. obtained by Beeuwkes and Mahaffy in 1934 for 220 specimens from children up to 14 years. [See this *Bulletin*, 1934, Vol. 31, p. 829.] In five of the children with full protection there were histories of illness suggesting yellow fever, two having been admitted to hospital suffering from fever and jaundice. A table is given showing the distribution and yearly incidence of fatal cases of yellow fever in Nigeria from 1934 to 1942 inclusive. During these periods there were 30 fatal cases, 21 European and 9 African, but with one or two possible exceptions there is no evidence of any epidemiological relationship between them.

The authors also tested 71 of the sera against standard Oxford suspensions of Typhoid-Salmonella, Proteus and Brucella groups of organisms. Only two gave readings suggesting an infection with Typhoid-Salmonella group. Twenty of the 71 sera gave a reading of 1/25 with *Proteus XK* and four a titre of 1/25 with *Proteus X2*. All were negative with the Brucella group. *E. Hindle.*

GIBBINS (E. G.). **On the Habits and Breeding-Places of** *Aëdes* (*Stegomyia*) *simpsoni* **Theobald in Uganda.**—*Ann. Trop. Med. & Parasit.* 1942. Dec. 31. Vol. 36. No. 4. pp. 151–160. With 2 figs.

It is now known that *Aëdes simpsoni* is a natural vector of the virus of yellow fever in Uganda. The author gives a brief account of breeding places of the insect in that country.

In Uganda this insect nearly always breeds in the axils of plants, though the larvae have occasionally been found in tree holes, a breeding place which is common enough in other parts of Africa. Breeding in axils can only occur in certain plants whose leaf bases are so shaped and wrapped together that they hold water for prolonged periods. There are three common food crops in which the insect often breeds: one particular variety of plantain, an Aroid (*Colocasia*) with an edible root, and the pineapple. Breeding also occurs in several other plants. Different parts of Uganda differ greatly from one another in the prevalence of these plants.

The adult mosquito is often common in native gardens but it seems that it never enters villagers' huts or any other type of building. The range of flight appears to be very short. The insect bites by day, generally early or late rather than in the middle of the day.

P. A. Buxton.

HARRIS (William H.), Jr. **Comparison of Pathologic Observations in Weil's Disease and in Yellow Fever.**—*Arch. Pathology.* 1942. Oct. Vol. 34. No. 4. pp. 663–673. With 3 figs. [Numerous refs.]

The author made a pathological study of a fatal case of Weil's disease that occurred recently in the neighbourhood of New Orleans, and compared his results with stock tissues of two cases of yellow fever obtained locally several decades previously.

The most striking difference noted between the two diseases was the more extensive tissue injury in both the liver and kidneys in the cases of yellow fever. The differences, however, are known to be variable and should not be considered as pathognomonic. A definite differentiation is afforded by the presence or absence of *Leptospira icterohaemorrhagiae* in Levaditi-stained sections.

It is pointed out that Weil's disease is either increasing in the U.S.A. or recognition of the disease is becoming better established.

E. Hindle.

SANDFLY FEVER.

DEMINA (N. A.) & LEVITANSKAJA (P. B.). Etude sur la fièvre pappatacci. Communication X. Essais de culture du virus de la fièvre pappatacci sur la membrane chorio-allontoide de l'embryon de poule. [**Studies on Pappataci Fever. X. Attempts to cultivate the Virus on the Chorio-Allantois of Chick Embryo.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1940. Vol. 9. No. 3. [In Russian pp. 272–284. With 9 figs. French summary p. 284.]

Sandfly fever virus, in the form of serum taken from patients shortly after a rise of temperature, was inoculated in the chorio-allantois of 10-day chick embryos incubated at 38–39°C. Microscopical examination revealed in all cultures a characteristic reaction consisting of proliferation, necrosis and desquamation of the ectodermal cells, followed by infiltration of mesoderm and proliferation of the entodermal cells. These changes occur at the site of inoculation and in the adjoining zone, being most pronounced after 72 hours' culture at 39°C. Controls (chorio-allantois of normal embryos and those inoculated with avirulent sera or neutral mixtures of virulent and immune sera) did not react in the same manner. Injection into seven volunteers of pieces of chorio-allantoic membrane taken near the site of inoculation (from primary and sub-cultures) failed to produce infection or immunity, whereas emulsions, both of the whole membrane and of whole embryos, infected six and two volunteers respectively, with symptoms of typical phlebotomus fever. *C. A. Hoare.*

DEMINA (N.). **Studies on Pappataci Fever. XI. Further Investigations on the Pappataci Virus in Culture.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1941. Vol. 10. No. 2. pp. 271–283. With 2 figs. [In Russian.]

Sandfly fever virus inoculated directly into the yolk sac of chick embryos produced cultures in which both the chorio-allantois and embryo were virulent, as was demonstrated by successful infection of mental patients. In cultures on the chorio-allantois both this and the embryo proved to be virulent two, three and six days after incubation. A temperature of 37°C. appears to be more favourable for the incubation of eggs after inoculation of the virus than 39°. The author has grown the virus in chick embryo and its membranes for prolonged periods. Of two strains maintained by her one was virulent after 30 subcultures, the other after 26, though in both the virulence was continuously manifested only till the tenth subculture. Later passages behaved in an irregular manner, some losing not only their virulence but also their antigenic properties. The virus of early passages proved to be less stable when kept at 2–4°C. than virulent serum. When grown by Maitland's method, but without addition of serum, the cultures remained virulent till the seventh passage. *C. A. Hoare.*

DEMINA (N.). **Studies on Pappataci Fever. XII. Further Observations on Stability of the Pappataci Virus against Different Chemical and Physical Agents.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1941. Vol. 10. No. 2. pp. 283–287. [In Russian.]

In the course of investigations on the attenuation of sandfly fever virus for immunization purposes, and on the preservation of the virus,

the following observations were made : (1) The virus is inactivated (*a*) after treatment of virulent serum for 48 hours with commercial formalin (1 : 1,000) ; (*b*) after drying the serum in a vacuum-desiccator over both H_2SO_4 and $CaCl_2$, with acetone, or with a mixture of phosphates. (2) Attempts to adsorb the virus from serum at *p*H 6·8–6·9 with aluminium hydroxide and kaolin were unsuccessful. (3) The virus can be preserved for at least 8 months by drying in the Flosdorf-Mudd apparatus. *C. A. Hoare.*

PLAGUE.

BURGA SAAVEDRA (Victor). Dos casos de peste en su forma búbonica tratados con éxito por sulfatiazol. [**Two Cases of Bubonic Plague Successfully Treated with Sulphathiazole.**]—*Actualidad Méd. Peruana.* Lima. 1942. June. Vol. 8. No. 2. pp. 26–27.

Both of these cases of bubonic plague had been proven bacteriologically. The first patient, 17 years of age, received a total dose of 16 gm. sulphathiazole in six days, while the second, age 21 years, after a dose of 10 cc. antiplague serum received 13 gm. sulphathiazole over six days. Both patients recovered completely. *W. F. Harvey.*

SAVINO (Enrique) & VILLAZÓN (Nestor Morales). Acción de la " Sulfanilamida " y sus derivados en la peste experimental. [**Action of Sulphanilamide, Sulphapyridine and Sulphathiazole in Experimental Plague.**]—*Rev. Inst. Bacteriológ. " Dr. Carlos G. Malbran."* Buenos Aires. 1942. Sept. Vol. 11. No. 1. pp. 70–76.

The drugs were used in suspensions of 30 per cent. in 20 per cent. gum arabic and were administered subcutaneously or orally. Test guineapigs were inoculated immediately after injection with a suspension of virulent plague bacilli and were kept under observation for a month. Only sulphanilamide was tried out by oral administration and this was quite inefficacious. The minimum lethal dose of plague gave rise, when sown on agar, to 6–9 colonies, and this caused the death of guineapigs in three to ten days. Results show that sulphathiazole and sulphapyridine were both superior to sulphanilamide in their power of protection. The authors' conclusions are : (1) Sulphanilamide in the doses of 0·5 and 1·5 gm. did not protect the guineapig even against the inoculation of one minimum lethal dose of plague. (2) Sulphathiazole or sulphapyridine protect guineapigs in some cases even against 10,000 minimum lethal doses. (3) In some cases guineapigs previously treated with sulphathiazole or sulphapyridine, and then inoculated with plague, developed a bubonic type of infection or a latent infection (only demonstrable by inoculation of the viscera of these animals into a healthy animal). In some cases this " inapparent infection " could be shown by the simple sowing of the bone marrow on Fildes's agar. *W. F. Harvey.*

STEWART (M. A.). **Carbon Disulphide in the Control of Sylvatic Plague Vectors.**—*Amer. Jl. Hyg.* 1942. Nov. Vol. 36. No. 3. pp. 243–246.

In former experiments methyl bromide had been found to be the most efficient lethal fumigant, out of 13 poisonous gases tested, for

dealing with plague rodents and their fleas. The present paper represents a re-examination of the efficacy of carbon disulphide when the liquid is introduced into the ground-squirrel burrow in atomized form, and the opening closed. The greater cheapness of carbon disulphide and its lesser toxicity to human beings gives it a marked advantage over methyl bromide, although it has the disadvantage of being explosive. "It can be concluded that fumigation of ground-squirrel burrows with even small quantities of carbon disulphide is highly efficient in killing the rodents . . . but the chemical is very uncertain and inefficient in its lethal action on adult fleas on the hosts." Even in amounts as high as 4 ounces per burrow opening it could not be depended on to kill fleas, and if amounts greater than this were used it ceased to be cheaper than the more efficient pulicide, methyl bromide.

W. F. Harvey.

BACILLARY DYSENTERY.

Dick (John C.). **Histological Findings in Fatal Cases of Bacillary Dysentery.**—*Jl. Roy. Army Med. Corps.* 1942. Nov. Vol. 79. No. 5. pp. 240–245.

This paper presents a valuable summary of the histological pathology of bacillary dysentery as observed in the Middle East.

Tissues from 17 cases were examined and this number as compared with the total incidence of bacillary dysentery for the period under review (January 1st to May 31st, 1941) fixes the case mortality rate at less than 1/2 per cent.

Bacteriological findings were necessarily incomplete, but *Bact. dysenteriae*, Shiga 6, Flexner 1, and atypical 1, were isolated.

Duration of the disease for a week or under, 3 cases, two weeks (11–15 days) 4, three weeks 7, and four weeks (47–70 days) 3.

Large Intestine.—In sections of the colon the whole range of acute, subacute and chronic inflammatory changes was seen in the mucous and submucous layers. This process was confined to the mucosa and superficial area of the submucosa, except where it followed the lymphatic and blood vessels to the deeper zones and for a short distance into the muscular layers. The ganglion cells of Auerbach's plexus were frequently involved in this perilymphangitic inflammation; this probably explains the increased irritability of the colon.

Macrophage cells figure prominently in the inflammatory exudate; they appear at an early stage in the acute ulcers, and are numerous in granular tissue of chronic lesions. Sometimes they are under the peritoneum. In size they are larger than plasma cells, 30–40μ in diameter and often contain ingested red cells, polymorphs and cellular fragments. In chronic ulcers the submucosa is replaced by a thick layer of granulation tissue with numerous young capillaries and fibroblasts.

Congestion of blood vessels is marked and interstitial haemorrhages common, whilst in fulminant cases there is ample evidence of preformed thrombi in the veins, which are held responsible for the pathological changes in the liver and spleen.

Ulceration of the colon is generally most intense in the sigmoid and rectum. Acute inflammatory changes are present in the terminal

ileum. Inflammatory changes are also found in the mesenteric glands with pronounced macrophage activity. In extremely severe cases fatty changes with some necrosis of liver tissue were noted.

The spleen showed changes usually present in septic conditions, such as congestion of the pulp and reticulo-endothelial activity. Special attention was paid to the kidneys, in which were found significant changes. These were associated with Shiga infections and were especially marked in the early cases of one to two weeks' duration. They consisted of patchy glomerular congestion and catarrhal changes, especially in the convoluted tubules. The picture on the whole was suggestive of early glomerulo-nephritis.

In others of longer duration, from three to four weeks, the kidneys were enlarged with increased size and cellularity of the tufts. The first convoluted tubules were either necrosed or showed extensive cloudy swelling.

Signs of kidney lesions were observed in serious cases which eventually recovered, such as oedema, albuminuria, granular casts, and increased blood urea. In one case paracolon bacilli were present in the urine. Undoubtedly this nephritis may be a contributory cause of death. The importance of emboli in the liver and spleen is stressed, and these may be carried to the lungs, causing infarct and bronchopneumonia.

[Invasion of the glomeruli of the kidneys by *Bact. coli* and concomitant changes in the convoluted tubules were originally described in chronic Shiga dysentery by J. I. ENRIGHT and the reviewer (see this *Bulletin*, 1919, Vol. 13, p. 347)]. *P. Manson-Bahr.*

BREWER (Angus E.). **The Use of Sulphaguanidine in Bacillary Dysentery.**—*Brit. Med. Jl.* 1943. Jan. 9. pp. 36–40.

These observations were made on a series of 600 patients suffering from bacillary dysentery in a general hospital in the Middle East, over a period of eight months. Of these 77 were treated with sulphaguanidine, which was reserved for severe or refractory cases. Twenty-six were classified as acute, 51 as chronic. This differentiation was based on the duration of disease ; all lasting less than two weeks were considered acute ; the chronic cases lasted from over two weeks to many months.

In the first group toxaemia was severe, with frequent stools consisting of blood and mucus only. The majority had received no previous treatment, although a few had had castor oil and sodium sulphate.

Arbitrary indications were used as a means of gauging dosage of sulphaguanidine : 3·5 gm. four-hourly until the patient's general condition showed marked improvement and reduction of stools to five or fewer in 24 hours and they had become faecal ; or 3·5 gm. four times a day until the infrequent stools became semi-solid ; or 3·5 gm. three times a day until two or three days after the stools had become normal.

Treatment with sulphaguanidine was started with an initial dose of 7 gm. in the form of a powder stirred up in 2 oz. of water. In very severe cases this was followed up by 3·5 gm. in two hours and again at the same interval. No difficulty was encountered in getting the patients to eat, as the desire for food returned invariably in the first 48 hours.

Adjuvant treatment consisted of 30,000 units of antiserum in the case of Shiga infections, bismuth and chalk, and tinct. opii in 10 min. doses or gr. 1/4 morphine to relieve pain.

Treatment was controlled by sigmoidoscopy. Out of a total of 26 acute cases treated 16 were Shiga, six Flexner and four undetermined; 19 were cured, of which 11 were severe and eight very severe. The average total dosage in severe cases was 110 gm. over nine days; in very severe cases 180 gm. over 12 days. Two severe Flexner infections, treated on the first and second day of onset respectively, responded quickly; treatment lasted a week with a total dosage of 91 gm. and in spite of the severity of the infection stools were formed, without blood, on the fifth day.

Seven cases were considered not completely cured, five of which were severe, two very severe. The average total dosage was 90 gm. over six days, and the response to treatment was satisfactory; relapses, however, subsequently occurred, but colonic wash-outs ultimately produced complete healing.

In the chronic series, out of 20 cases treated with sulphaguanidine in the same way as the acute cases, nine were not cured. In these symptoms returned, and sigmoidoscopy showed that, although the stools appeared normal, the mucosa had not healed. The total daily dosage was therefore raised to 17·5 gm. and the course lengthened. Of the 51 chronic cases treated 20 were Shiga infections, 14 Flexner and 17 unidentified. The chronic cases were divided into two groups—the first (20 cases) received 90 gm. over six days; the second (31 cases) 160 gm. over 10 days.

Toxic symptoms were rare, occurring in only nine patients out of the 51 chronic cases so treated. They comprised rashes, nausea, headache, tachycardia and fever. In all but two cases a dose of at least 100 gm. had been given, and it was noted that all with toxic symptoms were relatively constipated. It is, therefore, assumed that the concentration of sulphaguanidine in the bowel was unusually high.

It is concluded that sulphaguanidine, like other sulphonamides, would appear to be bacteriostatic, and the dysentery bacilli gradually die off. Hence an efficient concentration of the drug must be maintained for some time after the active infective process has been inhibited. Such a stage is evidently reached when stools are almost normal, so that failure to continue sulphaguanidine makes a relapse likely. The early acute infections showed a quick response to treatment, and the longer the interval between the onset of the disease and commencement of treatment, the longer was treatment necessary.

In the initial stages of treatment adjuvants, such as tinct. opii, bismuth and chalk and kaolin, lessen the frequency of the motions and increase the consistency of the faeces, which probably increase the concentration of sulphaguanidine in the bowel.

In chronic cases it would seem that passage of normal stools and disappearance of symptoms indicate only that the infective process has been inhibited, but not that healing of the mucosa has taken place, and if sulphaguanidine is not continued the infective process may again become active, thus delaying healing for some weeks.

P. Manson-Bahr.

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

SHIH LU CHANG. **Studies on *Entamoeba histolytica*. I. Effect of Hydrogen-Ion Concentration on Encystation of *E. histolytica* in Culture.**—*Amer. Jl. Trop. Med.* 1942. Sept. Vol. 22. No. 5. pp. 471–485. With 3 figs. & 1 plate.

The author has studied the influence of *p*H on the encystment of *Entamoeba histolytica* in culture media, by inoculation of amoebae from stabilized cultures into a fluid medium consisting of buffered phosphate in sodium chloride solution, liver fluid and rice starch. It was first determined that the optimum salt concentration could be attained by a M/30 phosphate in 0·4 per cent. sodium chloride solution, giving a salt concentration of 0·87 per cent. The liver extract favours the growth of amoebae but the amount of liver extract required to make up the medium within the ratio of 1 : 60 to 1 : 160 to that of the phosphate salt solution, affected the encystment only through its effect on the *p*H values. Amounts of encystment medium of 15–20 ml. seem to maintain a favourable *p*H range better than smaller or larger amounts. On the basis of this study the medium proposed for the encystment of *E. histolytica* is the following. It is composed of 15–20 ml. of M/30 phosphate buffered at *p*H 7·6, $\frac{1}{8}$ to $\frac{1}{6}$ ml. of liver extract fluid and 2–3 loopfuls of rice starch. To assure good results the initial *p*H of the medium should not be lower than 6·8. It will then be found that after 24, 36 and 48 hours' incubation the *p*H values will be 6·7–6·9, 6·8–7·0 and 6·9–7·2 respectively. Good encystment was always preceded by abundant growth, which did not occur until after 24–36 hours of incubation when the *p*H value of the medium was 6·8–6·9. It was further noted that encystment was best when the rate of growth of the amoebae in the encystment media was definitely greater than it had been in the stabilized culture. *C. M. Wenyon.*

MATEVOSSIAN (Sh.), SARKISSIAN (M.) & MARKARYAN (A.). **On the Existence of Strains of *Entamoeba histolytica* with Different Virulence.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1941. Vol. 10. No. 2. pp. 264–267. [In Russian.]

In a previous paper [see this *Bulletin*, 1937, Vol. 34, p. 326] it was demonstrated that various strains of *Entamoeba histolytica* were pathogenic to kittens, irrespective of whether they had been isolated from patients suffering from clinical symptoms or from healthy carriers. The object of the present work was to determine (1) if the severity of symptoms depended on differences in the virulence of the strain of amoebae, and (2) the degree of constancy of virulence in different strains. Tests were made with the following five strains: (1) from a carrier, (2) case of chronic amoebiasis, (3) latent amoebiasis, (4) acute amoebiasis, and (5) acute relapsing amoebiasis. Cultures of these strains were inoculated *per rectum* to healthy kittens. The criteria of virulence were: (1) infectivity to kittens (percentage of infected animals), (2) duration of infection in them, (3) character of pathological changes (severity of lesions, depth of penetration of the gut wall). No significant difference was found between any of the five strains as regards virulence and pathogenicity. *C. A. Hoare.*

GORDON (E.). **Purification of Sewage from Cysts of Intestinal Protozoa.** —*Med. Parasit. & Parasitic Dis.* Moscow. 1941. Vol. 10. No. 2. pp. 236–243. [15 refs.] [In Russian.]

Repeated examination of the Moscow sewage in the course of three years revealed viable cysts of the following intestinal protozoa: *Entamoeba histolytica, E. coli, Giardia intestinalis, Endolimax nana* and *Iodamoeba bütschlii.* It has also been demonstrated that after having passed through all stages of purification and when about to be emptied into the river, the sewage effluent still contained viable cysts. Since cysts of the dysentery amoeba retain their viability in water for a long time their elimination from sewage is a matter of some importance. With this object in view the author determined the effect upon the cysts of various factors involved in the purification of sewage.

For the detection of cysts the following methods were employed: (1) the effluent was allowed to stand 24 hours, after which the lower layer was centrifuged; (2) the effluent was filtered and the deposit collected; (3) it was coagulated with alum; and (4) concentrated by floatation with zinc sulphate.

It was found that standing for periods up to 6½ hours, with or without coagulation by $FeCl_3$, failed to eliminate all the cysts from the sewage effluent. On the other hand, filtration of sewage through a two metre layer of soil removed them all. It is well known that chlorination of water does not kill the cysts of *E. histolytica.* In the present experiments it was shown that exposure to high concentrations of chlorine (up to 12·7 mgm. residual Cl per litre, acting for 30 minutes) had no effect upon them. *C. A. Hoare.*

TSHALAIA (L.). **A Species of *Entamoeba* detected in Sewage.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1941. Vol. 10. No. 2. pp. 244–252. With 2 plates. [13 refs.] [In Russian.]

In the course of examination of sewage from the Moscow system for evidence of contamination with cysts of intestinal protozoa, a free-living Entamoeba, morphologically similar to the human dysentery amoeba was discovered.

Crude sewage was allowed to stand and the effluent fluids were filtered, after which the sediment of the former and deposit of the latter were examined microscopically and by cultivation. The examination revealed, in addition to various free-living protists, cysts of *Entamoeba coli, Iodamoeba bütschlii, Endolimax nana* and *Giardia intestinalis,* as well as cysts resembling those of *Entamoeba histolytica.* The last-named cysts—and later active amoebae—were observed regularly in the course of two years in various parts of the sewer system and at all seasons, the total number of strains isolated being fifteen.

The active amoebae measure from 10 to 120μ, the mean being 25μ. The ectoplasm is well demarcated from the endoplasm. Movements are very rapid, usually in one direction by means of a single pseudopodium. In hypotonic solutions there sometimes appears a structure comparable with a contractile vacuole. The nucleus is typical for the genus: it has a small central karyosome, peripheral chromatin consisting of evenly distributed granules, and some chromatin between karyosome and membrane. The majority of amoebae are uninucleate but in cultures there occur large multinucleate individuals with up to 32 nuclei. Cysts measure

5–16μ in diameter (mean 10μ), and have from one to four nuclei. There is a large glycogen vacuole, especially in young cysts, and chromatoid bodies in the form of rods and blocks. When hatched, the quadrinucleate amoeba gives rise to eight metacystic amoebae. The amoeba in question can be cultivated not only in the usual media employed for human intestinal protozoa but also in hay-infusion and tap-water, to which starch is added, at temperatures from 15° to 37°C. At 37° cultures survived for 2–3 weeks, and at room temperature for 2½ months in the same tube. Subcultures were usually made every 10–15 days. The amoebae are viable 20 days at —2°C., and 1½ months at 0–2°C., but they are less resistant to high temperatures, 39°–40°C. being the maximum tolerated. Attempts to infect kittens with this amoeba failed.

Morphologically it is like the entamoebae of man and cold-blooded animals with quadrinucleate cysts, its resemblance being especially close to the frog-amoeba (*E. ranarum*), which is practically indistinguishable from *E. histolytica*.

In discussing the origin of the sewage amoeba, the author rejects the possibility of its being *E. histolytica*, in view of its preference for low temperatures. On the other hand its identity with the intestinal amoebae of cold-blooded animals is doubted because it appears to be so common everywhere in the sewage, though the effluents from the Zoological Park (the only possible source of contamination by these animals) form only an infinitesimal fraction of it.

In view of these facts the amoeba is regarded as a free-living, coprophilic species of *Entamoeba*, for which the name *E. moshkovskii* sp. n. is proposed. The two plates illustrating the paper show amoebae and cysts which (except for the multinucleate forms) are indistinguishable from *E. histolytica* and *E. ranarum*.

[As the occurrence of living *Entamoeba histolytica* in sewage would be of some importance in the epidemiology of human amoebiasis, caution should be exercised in accepting the author's interpretation that the new amoeba is a free-living form. In this connexion two facts are significant: (1) Among the cysts of human intestinal protozoa recovered from sewage those of true *E. histolytica* are the only ones not mentioned at all though they have been recorded from sewage of the same locality by GORDON (above); it is, therefore, not improbable that they also occurred in the present author's material. (2) On the other hand, the arguments against the possible introduction of *E. ranarum* into the sewage are not sufficiently convincing. It is, therefore, conceivable that actually cysts of both the human and batrachian amoebae (as well as active forms of the latter) were present in the sewage. The whole question obviously stands in need of critical re-investigation.] *C. A. Hoare.*

ZATURIAN (A.). **Diseases caused by Intestinal Protozoa in Erevan.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1941. Vol. 10. No. 2. pp. 260–264. With 1 chart. [In Russian.]

Surveys of certain groups of the population of the township of Erevan (Armenian Republic), conducted between 1936 and 1938, revealed a fairly high incidence of infection with intestinal protozoa. The total number of persons examined was about 1,600, the majority manifesting some intestinal disorder. *Entamoeba histolytica* was found in up to 33 per cent., of whom 16·2 per cent. showed intestinal symptoms

(adults 18·9 per cent., children 9·7 per cent.). The incidence of amoebiasis was highest in the summer and autumn months, reaching a maximum in August. Clinically the majority were medium or mild cases. The incidence of giardiasis among children reached 20·8 per cent., the most vulnerable ages being from 1½ to 3 years. The percentage of other intestinal protozoa was as follows (the first figure refers to patients with intestinal symptoms, the second to healthy adults, the third to healthy children): *Entamoeba coli* 16·2, 57·4, 47·9; *Iodamoeba* 6·6, 35·1, 33·6; *Endolimax* 3·9, 29·0, 18·3; *Giardia* 10·6, 7·4, 17·4; *Trichomonas* 16·5, 3·7, 13·2; *Chilomastix* 7·1, 7·4, 8·1; other flagellates 0·1; *Balantidium* 0·1, 0, 0; protozoa absent from 46·8, 24·0, 25·3. *C. A. Hoare.*

STSHENSNOVITSH (V.). **On the Occurrence of *Balantidium coli* and Other Intestinal Protozoa in Man.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1941. Vol. 10. No. 2. pp. 252–260. [27 refs.] [In Russian.]

A survey of the population in the Khanlar district of the Azerbaidjan Republic, in the course of which over 2,000 persons—mostly Armenians—were examined, revealed the following incidence of intestinal protozoa: *Entamoeba histolytica* 33·1 per cent. (including 12·5 per cent. with small race and 20·6 per cent. with large race), *E. coli* 31·3 per cent., *Iodamoeba* 23 per cent., *Endolimax* 10·7 per cent., *Giardia* 12·4 per cent., *Chilomastix* 9·4 per cent., *Balantidium* 5·1 per cent. The incidence of balantidiosis was considerably higher than previously reported for the same region (0·2 per cent.), and included a number of symptomless carriers of the ciliate. The higher figure recorded in the present investigation is attributed to the examination of freshly passed stools, in which the active ciliate is more easily detected. The insanitary conditions of the area investigated appear to be particularly favourable for the spread of intestinal infections. *C. A. Hoare.*

ROBERTSON (P. A. M.). **A Case of Balantidiosis.**—*Brit. Med. Jl.* 1943. Jan. 30. p. 145.

RELAPSING FEVER.

MINETT (J. Souttar). **Relapsing Fever in Abyssinia.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942. Nov. 30. Vol. 36. No. 3. pp. 189–194.

An account of relapsing fever in Abyssinia among a battalion of Gold Coast soldiers from the point of view of the medical officer of the battalion.

During the period 27th June to 12th October, 1941, 28 bacteriologically confirmed cases of relapsing fever occurred in this battalion when its strength was about 700. In addition there were 12 cases which were almost certainly this disease, although spirochaetes were not found in blood films. The louse vector was confirmed. There were nine fatal cases; in six death occurred on the second day after

admission. The author is of the opinion that greater altitude tends to a higher mortality [but the figures seem hardly sufficient to justify such an assumption].

It is suggested that intravenous injections of organic arsenicals (N.A.B., etc.) should be given to all patients however jaundiced.

This article supplements the account by CHARTERS [see this *Bulletin*, 1942, Vol. 39, p. 556], as the author was the medical officer of the battalion which supplied most of those cases. *E. Hindle.*

POPOV (P. P.) & ACHUNDOV (J. A.). Zur Frage ueber das Studium des Zeckenrückfallfiebers in Aserbaidjan. [**On Tick-borne Relapsing Fever in Azerbaidjan.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1940. Vol. 9. No. 3. [In Russian pp. 255–259. German summary p. 259.]

The authors report the discovery of an endemic focus of tick-borne relapsing fever in the Apsheron peninsula, this being the first record for Azerbaidjan. A strain recovered from a naturally infected *Ornithodorus verrucosus* was successfully inoculated into various rodents and carnivores, as well as into 49 patients with general paralysis, whose symptoms are described in detail. The vector (*O. verrucosus*) occurs naturally in the burrows of rodents, from some of which spirochaetes pathogenic to man were isolated. *C. A. Hoare.*

SOFIEV (M.). *Spirochaeta latyshewi* **n. sp. of the Recurrens Group.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1941. Vol. 10. No. 2. pp. 267–271. With 1 chart. [In Russian.]

A description is given of a new strain of spirochaete isolated (in 1938) in Middle Asia from gerbils, *Rhombomys opimus* and *Gerbillus eversmanni*, and the tick *Ornithodorus tartakowskyi* which is commonly found in the burrows of these rodents. This spirochaete is not infective to guineapigs, rats and dogs, but can be maintained in mice, in which the first attack of fever lasts only 4–5 days, with frequent relapses of 1–2 days each. The number of spirochaetes in the blood is very small, the maximum being 50–100 per field. The ticks do not readily feed on man. Attempts to infect six men by allowing 31 ticks to feed on them succeeded only in one, who had a single attack of fever on the 11th day, though spirochaetes persisted for 16 days. Thirty other persons were inoculated from mice, six being refractory, while 24 became infected; three of these had only three attacks, whereas in 22 the course was similar to that in typical tick relapsing fever but milder, the temperature not exceeding 39°C., and the attacks rarely lasting longer than 24 hours. The spirochaete is regarded as a distinct species to which the name *Spirochaeta latyschewi* sp. n. is given.

C. A. Hoare.

MAZZOTTI (Luis). Infección experimental de *Microtus mexicanus* por *Spirochaeta turicatae*. [**Experimental Infection of** *M. mexicanus* **with** *S. turicatae*.]—*Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1942. Sept. Vol. 3. No. 3. pp. 213–216. English summary.

"*Microtus mexicanus*, a common field mouse of the Valley of Mexico, shows a great susceptibility to the experimental infection of *Spirochaeta turicatae*."

LOPEZ PORTILLO (Silvestre). Infección experimental de *Spirochaeta turicatae* de Mexico en enfermos de paralisis general. [**Experimental Infection with *Spirochaeta turicatae* in Patients suffering from General Paralysis of the Insane.**]—*Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1942. Mar. Vol. 3. No. 1. pp. 41–46. With 1 chart. English summary (4 lines).

Though the cases were few, only five, and the results not striking, this contribution is worth recording as it is a carefully noted account of relapsing fever experimentally produced by the bite of *Ornithodorus turicata* in one patient and inoculation of his infected blood into others. The first was a general paralytic of 62 years, the others were males between 30 and 40 years who had been previously treated with arsenicals and malaria inoculation (*P. vivax*).

The incubation period was 6 days in the case of the man infected directly by the ticks (six were allowed to bite), and 7, 5, 4, and 3 days respectively in the others. There were no prodromata worth noting in four; the other had loss of appetite, nausea and vomiting. Symptoms set in abruptly in all, with malaise, depression and pain in the head and limbs; temperature ranged between 38° and 41°C., pulse 100–130, respirations 22–36 per minute. Frontal and occipital headache persisted during the fever period with pain in the leg muscles; the facies was congested and there was lachrymation; the tongue was furred, with red edges. No enlargement of liver or spleen was present and there was no jaundice. These symptoms continued for one to three days, perhaps becoming aggravated just before the crisis which was accompanied by shivering and profuse sweats. The period of apyrexia ranged between four and nine days after the first attack, between two and seven after the second and third, and between five and twenty after the fourth. One patient showed a mild, one-sided facial paralysis which cleared up after 20 days on arsenical treatment. None of the others presented any complications. The attacks were stopped, in one case by stovarsol, 1 gm. *per os*, after the fifth, in another by two injections of 0·6 gm. neosalvarsan at five-day interval (he was the one who had the facial palsy), a third had 0·6 gm. solusalvarsan at the beginning of the fourth febrile access; the other two received no treatment for the attacks; the spirochaetes could not be found in them after the fourth and fifth attacks respectively. All were under observation for 1½ months and in none were spirochaetes found in the blood after treatment. The author states: "We think some improvement was observable in two of the patients" as regards the nervous condition, but it must be borne in mind that four of them had had arsenic and malaria treatment previously. *H. Harold Scott.*

LEPROSY.

AUSTIN (C. J.). **Central Leper Hospital, Makogai (Annual Report for 1940).**—*Fiji, Legislative Council, Suppl. to Council Paper No. 6.* 1941. pp. 1–3.

This report shows continued good work in spite of the war. The new patients admitted numbered 141, of whom 57 came from the Cook and Gilbert Islands, and elsewhere outside Fiji. Neural cases in the first

or second stage formed 61·7 per cent., but 32 per cent. were in the advanced lepromatous stage. The total number of patients was 566, in half of whom the disease was of the lepromatous type. The injection of chaulmoogra preparations remains the most successful treatment. Dyes have been found of some value for local injection into lepromatous lesions, methylene and trypan blue and brilliant green having been thus used. In general reactions fluorescein and mercurochrome proved of value. Dilester (the ethyl esters of Dilo oil) retains its popularity for the relief of nerve pains. Improvement was obtained in 61·8–71·1 per cent., Indians doing best; 23 of a total of 43 patients conditionally discharged were Indians, 35 of whom had neural disease. Of 32 deaths 11 were from tuberculosis, eight from leprosy with exhaustion and five from septicaemia or pyaemia. Much cultivation of vegetables, etc., was carried out by the patients, who are paid for their produce, so the work is popular. The Sisters working in the settlement continued to do invaluable work, which is fully appreciated by the patients. *L. Rogers.*

RADNA (R.) & LIMBOS (P.). Contribution à la question du traitement de la lèpre: L'huile de Caloncoba welwitschii (Gilg.). [**Caloncoba Oil in the Treatment of Leprosy.**]—*Ann. Soc. Belge de Méd. Trop.* 1940. Sept. 30. Vol. 20. No. 3. pp. 335–344.

The paper records the treatment of a few cases of leprosy with Caloncoba oil. The oil is obtained from the seeds of *Caloncoba welwitschii* and *C. glauca* of the Congo, which belong to the Flacourtiaceae; they are so common that cultivation is not required. They are rich in substances of the chaulmoogric acid series and, after careful washing to remove the pulp, the oil has been extracted from the seeds by boiling in water, extraction with a mixture of alcohol, acetone and chloroform or by petrol ether. It can be injected either subcutaneously, intramuscularly, intradermally or intravenously after drawing up some blood from the vein into the oil in a syringe, and does not produce occlusion of the vessels. Creosote 4 per cent. is added to the oil, which can be given in doses of 2 to 5 cc.; as many as 69 intramuscular injections have been given to a patient in the course of seven months; little reaction or induration is produced. In five nerve cases treated in 1935 some of the macules disappeared for long periods, and in a further series of nine cases treated in 1939 good effect on the macules and the healing of ulcers were observed, and in one lepromatous case the lesions became smaller and softer. The authors point out that these promising results require to be confirmed in a much larger series of cases followed up for a considerable time. *L. Rogers.*

DHARMENDRA, LOWE (John) & MUKHERJI (N.). **Studies of the Lepromin Test. (7). Variations in the Results of the Mitsuda Test observed in Cases of Leprosy of the Neuro-Macular Type.**—*Leprosy in India.* 1942. July. Vol. 14. No. 3. pp. 86–92.

The authors report the results of lepromin tests in 180 neuromuscular cases of leprosy to ascertain the results of repeating the test in different circumstances. They found the second reactions weaker than the first in 105, stronger in 20 and similar in 55 cases. They noted a tendency for the reactions to be stronger in the summer than in the winter months, and that subsidence of clinical activity is associated

with a diminution in reaction to lepromin, but have not had an opportunity of demonstrating if the reverse is also true. Carefully standardized different lots of lepromin showed but slight variations in the reactions produced by them. Variations in the bacteriological findings could not be assessed separately from those in clinical activity.

L. Rogers.

DHARMENDRA, LOWE (John) & MUKHERJI (N.). **Studies of the Lepromin Test. (8). Attempts to increase the Reaction to Lepromin in Cases of Leprosy by Repeated Testing.**—*Leprosy in India.* 1942. July. Vol. 14. No. 3. pp. 93–95.

The authors point out that several workers, from BARGEHR [this *Bulletin*, 1927, Vol. 24, p. 559] in 1926 on, have reported that negative reactions to lepromin could be converted into positive by repetitions of the test, but without any increased resistance of the patients being noted. The present report deals with 27 neural cases in which lepromin tests were repeated monthly, usually to a total of five to 15 injections. The initial test had given weak reactions in 13 and negative in 14, and repeated tests showed no change in nine, slightly weaker ones in 10 and slightly stronger ones in eight cases. Similar trials in 62 lepromatous cases, only four of which gave an initial weak reaction and the rest negative ones, showed no change in 47 and slightly stronger reactions in only two. The authors were therefore unable to confirm the reports of previous workers. *L. Rogers.*

CHANDY (P. J.). **A Portable Injection Set Useful for Wayside Leprosy Clinics.**—*Leprosy in India.* 1942. July. Vol. 14. No. 3. pp. 96–97. With 5 figs.

LOWE (John). **Separation of Children from Infectious Parents and Others.**—*Leprosy in India.* 1942. July. Vol. 14. No. 3. pp. 98–100.

The separation of children from leper parents at birth is the ideal policy, but in the tropics the difficulties of artificial feeding may preclude this. The author reports on a visit to a leper institution in India where children were not separated from their parents and other leprosy patients until after the age of 18 months, with the result that 25 of them developed symptoms of the disease when 3 to 10 years of age. Of these 10 were 3–4 years old, 10 were 5–7 years and five were 8–10 years. It is not known how many children escaped infection. The author advises separation as early as possible, but not later than six months [although elsewhere in some reported cases even that short time permitted of infections taking place]. Contact with any infective patients should be reduced to a minimum during the few months' residence. Adoption of the children from birth by relatives affords a still better method of avoiding such lamentable infections, and marriages of lepers of child producing ages should be prohibited in leper institutions. *L. Rogers.*

HELMINTHIASIS.

VASSILKOVA (Z.). **Evaluation of the Contamination of Vegetables with Eggs of Helminths in Sewage Farms with Different Methods of Cultivation.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1941. Vol. 10. No. 2. pp. 217–225. With 1 chart. [Numerous refs.] [In Russian.]

In connexion with the extensive development of vegetable gardens in the outskirts of Moscow and other towns of U.S.S.R. it is proposed to use sewage for manuring. The danger of contaminating vegetables with the eggs of helminths necessitated the adoption of preventive measures. With this object in view preliminary investigations were undertaken (1) on dehelminthization of sewage, (2) to determine the degree of contamination of the soil with eggs of helminths, and (3) that of vegetables when cultivated by different methods.

The results of these tests were as follows. One litre of sewage contained 19 ova, including Ascaris, Trichuris, Diphyllobothrium and Taenia. In soil irrigated with sewage the ova of seven species of parasitic worms (97 per 6,600 gm.) were present. Contamination of vegetables cultivated by different methods was found to be as follows (expressed in number of ova per 100 specimens of vegetables) : cucumbers 5 to 7, tomatoes 2·8 to 16, carrots 2. Of all the ova removed from vegetables only those of Ascaris (36 per cent.) were viable.

On the basis of observations made in the course of this investigation it is suggested that vegetables grown on sewage farms can be protected from contamination—without loss of the fertilizing properties of sewage—as follows : (1) Before being used for irrigation sewage should be allowed to stand two hours in special ponds. During this period 72 per cent. of the ova are lost by sedimentation, while the sludge can be utilized for manuring after being composted with rubbish. (2) Vegetables should be irrigated by infiltration of the beds through trenches. Cucumbers must be grown on wide beds ; in the case of tomatoes irrigation should be discontinued after flowering ; carrots and parsley beds must be 15 cm. high. (3) All vegetables consumed raw should be gathered directly into baskets or sacks, but not laid on the ground.

C. A. Hoare.

VASSILKOVA (Z. G.). Vitalité des oeufs d'helminthes dans les fosses d'aisance. [**Viability of Helminth Eggs in Pit Latrines.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1940. Vol. 9. No. 3. [In Russian pp. 231–237. With 2 figs. (10 refs.) French summary p. 237.]

This is a description of experiments on the viability of Ascaris ova in human excrement from pit latrines, the main object of which was to determine the length of storage before the excreta could be safely employed for manuring fields and kitchen gardens. Observations on the contents of experimental pit latrines were started in winter, spring and summer ; the pits were in constant use by workers of a State farm for a prescribed period of time, after which three were covered with boards (30 cm. above the surface of the faeces) and earth, while one was left open for continuous observations. From each of these, samples of faeces were collected by means of a long pump (1·5 m. by 6 cm.) once a month in the course of about one year, placed under suitable

conditions for development and kept under observation for five months.

The results were as follows. When examined immediately after removal the ova were invariably unsegmented. In the open latrine they all perished in six months. In the buried pits 97 per cent. died after 6–8 months, while 10–13 months were required for the destruction of 100 per cent. Since the destruction of the ova was more rapid in summer, complete dehelminthization can be obtained by burying the faeces in the early spring (February–March) for a period of eight months.

It was further demonstrated that in faeces diluted with water (1 : 1 by volume) 95·5 per cent. of the eggs perished only after 20 months. Diluted faeces should, therefore, not be employed for manuring vegetables and berries consumed raw.

Two parts of boiling water acting upon one part of faeces for one hour proved to be lethal to Ascaris eggs. This method is advocated for dehelminthization of individual stools. *C. A. Hoare.*

TALIAFERRO (William H.) & SARLES (Merritt P.). **The Histopathology of the Skin, Lungs and Intestine of Rats during Passive Immunity to** *Nippostrongylus muris.*—*Jl. Infect. Dis.* 1942. July–Aug. Vol. 71. No. 1. pp. 69–82. With 5 plates. [16 refs.]

In previous work (1936 and 1939) the authors have shown that the local points of defence during active immunity of the rat to *Nippostrongylus muris* are the skin, lungs and intestine, which lie along the path of migration of the worm. They have described the cellular reaction in these sites when the worm is introduced into normal and into immune rats. The cellular reactions in actively immune animals, which are more intense than in normal rats, are chiefly associated with inflammatory responses to the secretions and excretions of the worms, and frequently result in the formation of nodules around the parasite in the skin and lungs. The immediate mechanism of immunity was found to be humoral with secondary cellular co-operation. The primary rôle of humoral factors is indicated by the passive transfer of immunity in varying degrees against all stages of the worm by means of serum from actively immunized rats. Under suitable conditions in passively immunized rats the worms are immobilized and precipitates are formed in and around them, just as in actively immunized animals.

The present study deals with passive as contrasted with active immunity. It was designed to illustrate further the rôle of antibodies in immunity by studying their action without previous mobilization of the cells of the lymphoid-macrophage system, and deals with: (1) the mechanism of passive immunity, (2) the mode of antibody-action on the worms, and (3) the passive transfer of "hypersensitivity to infection."

Specifically, the cellular and general inflammatory reactions, the formation of precipitates in and around worms, and the humoral effect on the worms, are described in passively immunized rats and are compared with the previous findings in rats after initial infection and after a test reinfection during active immunity.

A detailed description of the technique employed is given. The rats were free from Bartonella. All Nippostrongylus infections were initiated by applying infective larvae to the clipped and washed skin of the abdomen. The experimental animals were divided into three series. The 16 rats in series 1, which were used to study the reaction

developing in passive immunity, were two months old. Each rat received 5 cc. of immune serum per 100 gm. rat intravenously, and one-half to two hours thereafter about 5,500 larvae from a mixture of 8- to 11-day-old cultures. The animals were killed at intervals varying from four hours to 16 days after infection. (The immune serum for this series was obtained by pooling the serum from 180 rats over a period of eight months and was used after storage at 6°C. from 10 to 18 months. Each of the 180 rats received an initial infection of 5,000 to 7,000 larvae and, after two weeks, three super-infections of the same number of larvae at weekly intervals. They were bled a fortnight after the last infection.) That passive immunity occurred in the rats given 4 and 5 cc. of serum is shown by the following facts: (1) eggs appeared in the faeces after a slight delay (approximately one day), (2) the rate of increase in the number of eggs was slower, (3) the total number of eggs passed from the sixth to the tenth day of the infection was smaller, and (4) a few more worms were retained in the skin and lungs.

Seven rats were used in the second series of experiments. Each rat received approximately 3,500 larvae from 10- to 11-day-old cultures. Four of these rats were injected intraperitoneally from five minutes to one hour before infection with 1, 2, 4 and 8 cc. of immune serum, respectively. Three rats received no serum. All the rats were killed 10 days after infection.

The six rats of series 3 received an average of 6,000 larvae from 12- to 18-day-old cultures. Just before infection, three of the rats were injected intraperitoneally with 2, 4 and 8 cc. of immune serum respectively. The other three rats received no serum. All the animals were killed after infection.

The following tissues of the above animals were fixed for study: abdominal skin, left lobe of lung, duodenum just below the stomach with the pancreas attached, jejunum at about the position of the second aggregate nodule, jejunum at about one-third of the distance to the ileum, and ileum at a distance of 10 cm. from the caecum. All the tissues were fixed in Helly-Maximow's Zenker-formol, were embedded in celloidin and, after sectioning, were stained with Delafield's haematoxylin and counter-stained with eosin and azur II. A lengthy and detailed description of the histological findings is given. It is difficult to epitomize these in a summary of moderate length, and they should be consulted in the original by those interested. The paper is beautifully illustrated.

The authors give the following summary of their work :—

" Rats were passively immunized so that they exhibited a high but transient immunity as indicated by a delay in the skin of many worms for several hours with a maximum stay of a few worms for 3 days, *i.e.*, a delay of about 1 day; a longer delay and slight stunting of many worms in the lungs with the death and encapsulation of a few worms and a delay in arriving in the intestine due to their temporary retention in the skin and lungs, a stunting of the worms with a smaller number of eggs passed during the sixth through the tenth day of the infection and the premature expulsion of a few worms. The effects on the worm, such as their immobilization, stunting and the occurrence of precipitate, both within and outside of the worm near the body openings, are similar to, but less in degree than, those seen in animals actively immunized by repeated infections with large numbers of larvae. Similarly, the inflammatory responses are similar to, but less in degree

than, those seen in actively immunized rats. Passive immunity appears to be associated with the passive transfer of the hypersensitivity associated with repeated infection. Many of the evidences of immunity seen in the passively immunized animals a week or more after infection are probably due to the supervention of acquired immunity. Among these are the long immobilization and formation of nodules around a few worms in the lung and the later reactions in the intestine.

"The histopathological findings, especially in the skin and lungs, of the passively immunized animals add further evidence of the primary role of antibodies in immunity to *N. muris*. It is not clear, however, as to whether the difference in intensity of the reactions in passively, as compared to actively, immunized animals is due solely to an insufficient concentration of antibodies or, in part, to the lack of previous mobilization of the cells of the lymphoid-macrophage system in the local sites of the immune reaction." [See also this *Bulletin*, 1941, Vol. 38, p. 110; 1942, Vol. 39, p. 624.] *W. Yorke.*

SHELDON (A. J.) & GROOVER (M. E.), Jr. **An Experimental Approach to the Problem of Acquired Immunity in Human Hookworm** (*Necator americanus*) **Infections.**—*Amer. Jl. Hyg.* 1942. Sept. Vol. 36. No. 2. pp. 183–186.

Populations exposed to large numbers of infective larvae of *Necator americanus* for long periods acquire only moderate or subclinical infections and it has been assumed that they have acquired immunity from previous infections. There is no clear evidence that immunity is thus acquired by man, although OTTO and KERR [this *Bulletin*, 1939, Vol. 36, p. 833] have shown that dogs acquire specific immunity after repeated infections with *Ancylostoma caninum*; their experiments suggest that this immunity depends on a humoral antibody. Otto [this *Bulletin*, 1940, Vol. 37, p. 593] showed that the serum of dogs actively immunized by repeated infections with the larvae of *A. caninum* contained an antibody which produced, *in vitro*, a typical precipitin reaction around and in the mouth and round the anal and excretory openings of some of the larvae. Sheldon and Groover have tried this reaction in children infected with *N. americanus* and have obtained similar results.

By the Stoll egg count method they estimated the number of hookworms [see this *Bulletin*, 1923, Vol. 20, p. 950] in cases from an untreated group of white and coloured children in Brooks County, Georgia, belonging to the age group 6–19 years, this being the age group showing the highest incidence of hookworms. Infective larvae of *Necator americanus* were partially sterilized by three washes in sterile saline, followed by a 30 minute bath of 0·1 per cent. mercuric chloride and three further saline washes, and were then incubated in sera taken from the infected children with varying hookworm burdens. Larvae were also incubated in sera from uninfected children aged 10–13 from Boston, Mass., who had never been exposed to hookworm infection, and in physiological saline; these acted as controls.

The larvae in the sera of infected children showed no change until six hours after their incubation in these sera began, when some had exsheathed; these exsheathed larvae showed a fine, granular deposit round the oral, genital and anal openings. More larvae had exsheathed 7–24 hours after incubation began and some of these showed the deposits. The sheathed larvae showed no such deposits. The deposits did not seem to hinder the activity of the larvae. There were no

further changes 48 hours later, when most of the larvae had exsheathed and all seemed to be dead ; death was attributed to the fact that the sera had by then become very viscid.

In all 28 such reactions are tabulated. None of the larvae in the sera from the children never exposed to hookworm infection showed the deposits ; but in three sera of children who showed no infection at the time of the experiment the larvae showed deposits, and it was presumed that these children had been exposed to infection ; other members of their families were infected. The deposits in and around the larval openings were obtained in eight out of 14 children with very light, light or moderate infections. But in six children with heavy or very heavy infections no deposits were found.

The authors suggest either that the precipitin reaction is not specific, or that it is specific but plays no part in acquired immunity, or that it is specific and plays a part in acquired immunity in some cases only. The precipitins do not, *in vitro*, hinder the activity of the larvae, but may *in vivo* immobilize them, stunt them, prevent their assimilation of food and, as TALIAFERRO [this *Bulletin*, 1941, Vol. 38, p. 110] suggested, inhibit their enzymes. If they are specific, their inconstant presence in the sera of these children is difficult to explain. The authors suggest that factors in the technique and in the host (heredity, variations in titre, individual variation and diet), and in the environment, influencing the dissemination of hookworms, need to be considered. *G. Lapage.*

LARSH (John E.), Jr. **Transmission from Mother to Offspring of Immunity against the Mouse Cestode,** *Hymenolepis nana* **var.** *fraterna.*—*Amer. Jl. Hyg.* 1942. Sept. Vol. 36. No. 2. pp. 187–194.

Passive transfer of immunity to parasites from mother to offspring has been comparatively little studied, but its occurrence has been shown in infections with *Cysticercus fasciolaris* in rats, *Trichinella spiralis* in rats, rabbits and hamsters and *Trypanosoma lewisi* in rats. It has been shown that *Hymenolepis nana* var. *fraterna* produces a specific immunity in mice that lasts a long time.

The author used eggs of this cestode stored in tap water for 48–72 hours at room temperature, because these gave more cysticercoids than eggs taken from fresh faeces or from the proglottids. Eggs were given to mice by stomach tube and the cysticercoids were counted by the method of HUNNINEN [see this *Bulletin*, 1936, Vol. 33, p. 99]. The mice were killed 93 hours after the infection when most of the cysticercoids are mature and have not begun to break out of the intestinal villi into the lumen of the gut. Before the experiments the mice were checked at ten-day intervals by D.C.F. to make sure that they were free from helminths.

In the first series of six experiments a group of female mice aged three months were infected with *H. nana* var. *fraterna* eggs early in pregnancy and a similar group were not. The young of both groups were then given a test infection. In the young of the infected mothers 0·3 to 2·1 per cent. of the eggs given gave rise to cysticercoids, while 6 to 8 per cent. produced cysticercoids in the young of the uninfected mothers. In the second series of three experiments the development of the cysticercoids in two of the young of infected mothers was compared with that in two of the young from uninfected mothers ; and it was

found that some degree of passive resistance persists for 37–41 days after birth. The author thinks that this is due to the transfer of immune bodies from the mothers to their offspring.

In the third series of experiments mice were used that had been infected but were negative to three examinations by D.C.F. at the time of the experiment. The young of these and the young of uninfected controls were given test doses of eggs. Very few cysticercoids were found in the young of the mothers previously infected. The conclusion was that the young need not be *in utero* to acquire the immunity.

In the fourth series infected and uninfected mothers were interchanged immediately after parturition before the young began to nurse. The number of cysticercoids in the young born of and nursed by uninfected mothers was within the normal range; young born of infected mothers and nursed by uninfected mothers had far fewer cysticercoids, but by far the smallest number of cysticercoids was found in the young of uninfected mothers nursed by infected mothers. The conclusion was that the milk played a very important part in the transference of the passive immunity.

Further experiments showed that the young acquire antibodies both from the milk and *in utero*, but that the protection acquired from the milk is the better and lasts the longer. Immunity transferred *in utero* disappears 7–9 days after weaning, and is not as powerful. The author suggests that his results support other evidence that is accumulating to show that immunity to parasites resembles immunity to bacteria and viruses. *G. Lapage.*

AWAD (Salah H.) & ASHOUR (M.). **Carcinoma of the Pancreas with Bilharzial Infection.**—*Lab. & Med. Progress.* Cairo. 1942. May. Vol. 3. No. 1. pp. 20–22. With 1 fig.

CHANDLER (Asa C.). **First Record of a Case of Human Infection with Tapeworms of the Genus Mesocestoides.**—*Amer. Jl. Trop. Med.* 1942. Sept. Vol. 22. No. 5. pp. 493–496. With 1 plate. [10 refs.]

The author records the first known case of infection of man with the cestode *Mesocestoides variabilis*. No adult of this genus has been found before in any primate, although the larval stage, called the tetrathyridea, has been found in a baboon.

The patient was a white child, aged 13 months, seen at the Tucker Clinic at Nacogdoches in East Texas. There was a history of poor appetite, abdominal pain and loss of weight. The abdomen was tympanitic and slightly prominent and the spleen enlarged. Most of a dose of oleoresin of Aspidium was vomited, but this dose expelled some worms, and pieces of them began to reappear two weeks later. After a second treatment 35 feet of the cestode and other shorter pieces were expelled. No more were seen and the child was normal when it was seen 10 months later.

Chandler recovered four scolices from the material supplied, but thinks that more than four cestodes were present. They were larger than, but corresponded most closely to, *M. variabilis*, which Chandler had obtained in 1942 from raccoons in East Texas. A complete description of the species is given, because species of this genus are extremely variable in size and have few reliable characters.

In the United States *M. variabilis* has been found in a fox (*Urocyon*), in two genera of skunks (*Spilogale* and *Mephitis*) and in dogs. Other species have been found in the house mouse, kittens, opossums and a lynx. In the Old World species are known from hawks and eagles and all kinds of carnivores. The life cycle is not fully known. The larvae occur in the serous cavities or encysted in various parts of the bodies of reptiles, birds and small mammals. Cats may harbour both larva and adult simultaneously. The human infection recorded here was probably derived from eating improperly cooked flesh of a wild mammal or frog.

Tetrathyridea are long, contractile sparganum-like organisms measuring from 2–5 mm. long in reptiles to several cm. in mammals. They may be second larval stages, like the sparganum stage of Pseudophyllidea, infecting transport hosts which enable them to reach carnivores; but the first larva is unknown. Tetrathydridea given in their food to suitable carnivores require from two weeks to several months to become adults. *G. Lapage.*

HILL (Arthur W.) & ANDREWS (Justin). **Relation of Hookworm Burden to Physical Status in Georgia.**—*Amer. Jl. Trop. Med.* 1942. Sept. Vol. 22. No. 5. pp. 499–506. With 2 figs.

The programme for the control of hookworm now in action in Georgia emphasizes, as the unit of investigation and control, the infected family rather than the egg-positive individual. Diseased families are selected by the local health or school personnel. Selection is based, first of all, on physical evidence of anaemia. The next step is to determine which of the three commonest causes of secondary anaemia in Georgia (dietary iron deficiency, malaria or hookworm) is responsible in each case. Some quantitative approximation is therefore required of the hookworm burden at which the anaemia caused by the worms becomes apparent. To determine this the authors carried out physical examinations and haemoglobin estimations on individuals with varying egg counts.

All the patients examined were whites under 20 years old; the sexes were about equally represented. They lived in four counties of Southern Georgia on the sandy coastal plain where hookworm is highly endemic and malaria is not important. The low-income group predominated, although all classes were represented. Egg counts were done by the Stoll and Hausheer small drop dilution method on brine floatation positives. Tetrachlorethylene was used for the removal of hookworms and Blaud's pills to supply iron.

The 1,141 haemoglobin estimations done showed that the haemoglobin values decreased as the average egg counts increased, the decrease beginning in the group 2,000–4,000 eggs per cc. and becoming marked in the group 4,000–8,000. Hookworm control is recommended for families of anaemic individuals under 20 years with egg counts of 5,000 eggs per cc. or more. SMILLIE and AUGUSTINE [this *Bulletin*, 1926, Vol. 23, p. 772] found no deviation from normal height or weight development when light infections with average egg counts under 2,600 per cc. were present, although weights and heights were below normal in children with moderate or heavy infestations. The authors' Table 2 shows that a decrease of haemoglobin accompanies a rise of hookworm in Alabama, Mississippi and Georgia, the trends in Georgia and Alabama being most alike; in Mississippi the haemoglobin decreased more rapidly with light infections and showed a lower level

throughout. These differences are probably due to anaemia caused by other agents than hookworm. They show that local data should be obtained.

There was wide variation in individual reactions to worm burdens of about the same magnitude; these are probably explained by constitutional and nutritional differences. The commonest mild symptoms were pallor of the skin and mucosae and listlessness and increased liability to common illnesses; but these were often indistinguishable when the average egg counts were below 8,000 eggs per cc. and the haemoglobin above 9 gm. per 100 cc. More severe cases had blanched conjunctivae and mucosae, which finally became light sepia in colour or yellowish. Some had light yellow patches on the mucosa of the soft palate and oedema under the eyes, about the wrists and ankles and on the backs of the hands and tops of the feet.

In the advanced cases, 22 of which were studied, the egg counts being between 12,400 and 153,000 (average 64,000), the number of erythrocytes varied without relation to the egg counts between 1·2 and 3·8 millions; the haemoglobin values were between 2 and 11 gm., the colour index below 1 in every case except one (average 0·6) and the white cells were normal, except for eosinophilia of 2–24 per cent. Electrocardiograms were normal. Other clinical signs noted were general muscular weakness, oedema of the face and extremities, tachycardia, cardiac murmurs and enlargement of the heart. Marked oedema and heart signs were found in patients with haemoglobin values below 5 gm. and egg counts above 48,000, excepting one case. Winging of the scapulae, loss of subcutaneous fat and of muscle tonus are not specific for hookworm disease; they were almost always present and were probably due to a heavy worm burden combined with a deficient diet. Three-quarters of the patients with heart signs had tongues with smooth margins and other signs of nutritional complications. Diets of rural populations were deficient in animal protein, iron and vitamins.

Like the other workers quoted, the authors found that recovery was slow if the worms were removed without iron therapy. No anthelmintic was given until the haemoglobin had been raised to about 5 gm. The cases of two brothers are described to illustrate the disappearance of symptoms and rise of haemoglobin due to iron therapy. In one of these the haemoglobin value of 2 gm. (with an erythrocyte count of 1·36 millions) had risen after a month of iron therapy to 9 gm. and the size of the heart had been markedly reduced. After 2·5 cc. of tetrachlorethylene 1,378 worms were recovered during three days. Two months later the haemoglobin value was 12 gm. and the erythrocyte count 4·8 millions. The brother had a haemoglobin value of 2·5 gm. and an erythrocyte count of 1·9 millions. After five weeks of iron therapy the haemoglobin value was 10 gm. and the erythrocyte count 3·27 millions. After 2 cc. of tetrachlorethylene 1,123 worms were recovered. After a further three months of iron the haemoglobin value was 12 gm., the erythrocyte count 4·78 millions and the heart, at first markedly enlarged, had returned to normal size. *G. Lapage.*

BONNE (C.). **Invasion of the Wall of the Human Intestine by Ancylostomes.**—*Amer. Jl. Trop. Med.* 1942. Sept. Vol. 22. No. 5. pp. 507–509.

In 1937 the author described five cases of invasion of the wall of the small intestine by adult or "semi-adult" ancylostomes [see this

Bulletin, 1938, Vol. 35, p. 277]. In all five he found local circumscribed haemorrhages, especially in the submucosa, with inflammatory reaction rich in eosinophils. In four of the cases there was no connexion between these lesions and the cause of death, but in one of them death was due to purulent peritonitis with perforation of the jejunum and the worms could not be excluded as the cause. Invading ancylostomes lay eggs in the loose tissue of the submucosa; these and the larvae hatching from them may be seen in large numbers in the submucosa. Usually there is a single haemorrhagic patch containing a single worm "eventually accompanied by eggs and larvae," but some cases may show a dozen or more of such haemorrhages. The author, however, never found more than one worm in any single haemorrhage. Very often neither eggs, worms nor larvae are found, the parasite having probably vacated the lesion and returned to the lumen of the intestine.

From the damaged anterior end of one worm recovered from one only of the five cases described in 1937 SANDGROUND, who was visiting Java, was able to diagnose it as *Ancylostoma braziliense*, which is rare in man in Java, although it is common in dogs and cats. Five new cases are here described, from whom 231 hookworms were recovered from haemorrhages in the intestinal wall. All of these were specimens of *A. duodenale*. This diagnosis was verified by Sandground in one case. All the subjects were Malays, except one, who was Chinese. In one case a worm was recovered from a haemorrhage in the wall of the colon. In the lumen of the intestine *Necator americanus*, *Trichuris trichiura*, *Ascaris lumbricoides*, *Trichostrongylus colubriformis*, *Strongyloides stercoralis* and *Echinostoma ilocanum* were found.

Occasional invasion of the submucosa and sometimes of the muscularis is not specially a characteristic of *A. braziliense*, but it is remarkable that *Necator americanus* does not thus invade the tissues. Perhaps the reason is the absence of teeth from its buccal capsule. In sections the teeth of *A. duodenale* are seen to be hooked into the tissues and its buccal capsule is filled with tissue. As DARLING pointed out, *A. duodenale* is far less common in Java than *N. americanus*, especially in the Javanese. [See also this *Bulletin*, 1941, Vol. 38, p. 475.]

G. Lapage.

KASIMOW (G. B.). **The First Case of Ostertagiosis in Man.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1941. Vol. 10. No. 1. pp. 121–123. With 2 figs. [In Russian.]

Infection with *Ostertagia circumcincta* has so far been recorded from sheep, goat, cattle and some wild ruminants. The author reports the first finding of this nematode in man. After administration of anthelminthics the patient, a native of Azerbaidjan, passed in his stool two male specimens (together with several Trichostrongylus). The Ostertagia is described in detail, with two illustrations.

C. A. Hoare.

PETROV (M. I.). **New Case of Loa Infection.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1940. Vol. 9. No. 4. pp. 407–409. With 3 figs. [In Russian.]

Description of a new case of infection with *Loa extraocularis* Skriabin, 1917, in a woman residing in Daghestan (Caucasus). The infection, localized in the buttock, had persisted for two years before the patient

herself extracted a single specimen of the nematode from the subcutaneous tissues. A detailed description of the worm, with three illustrations, is given. *C. A. Hoare.*

BARLOVATZ (A.). Réaction inflammatoire de nodules d'Onchocerca volvulus au cours de certains états fébriles. [**Inflammatory Reaction of Nodules of *Onchocerca volvulus* in the Course of Certain Febrile States.**]—*Ann. Soc. Belge de Méd. Trop.* 1940. June 30. Vol. 20. No. 2. pp. 149–155. With 1 chart.

In one area of the Congo (not specified), the author saw frequent cases of acute congestion of nodules of *Onchocerca volvulus* (50 cases in three years), although he did not see a single case during a longer stay in another area (not specified), where verbal communications confirmed their rarity; there are few descriptions of such cases in the literature.

This acute, transient congestion of the nodules, often accompanied by congestion of the neighbouring subcutaneous tissues, is not part of the normal development of the nodules. Cases may be classified into two groups. In one group no other factor appears to operate. An example of this group is the case of a negro whose tibia was painful all along its length, with slight oedema; two nodules the size of a pin's head had recently appeared on the tibia. The evening temperature was 37·5°C. to 38°C. A third nodule appeared after four days. Each nodule contained a "small filaria." Excision of all three nodules abolished the pain and for the two following days the temperature did not rise above 37·2°C.

Cases in the second group are more frequent. In these there were large, painful filarial cysts surrounded by a zone of congested subcutaneous tissue which was often adherent to the warm skin over it. Usually there were other nodules which showed no inflammatory reaction. In the skin at the site of the inflamed cysts microfilariae were more often absent than present, and none could be found in the blood. There was no regularity in the distribution of such inflamed nodules; they were found on the sides of the body, the arms, thighs and legs. Usually there were several, most often four and never more than eight. When they were opened, one or two *Onchocerca volvulus* were found; these were alive or dead, and were bathed in thick, grey pus with cellular débris and sometimes microfilariae of the *O. volvulus* type. When the pus was sown on to agar or blood agar no bacterial growth resulted; when the cysts ruptured, during their removal, into the surrounding tissues healing by first intention was not hindered; after their removal the wounds healed in 24 to 48 hours. The pus therefore seemed to be sterile.

In the first series of cases the removal of the cysts led to disappearance of the fever, as in the cure of subcutaneous abscesses by incision. In other cases the cysts decreased in size and the pain and subcutaneous reaction disappeared even without removal of the cysts.

But in other cases the fever did not fall after removal of the cysts, because some other cause of the fever was present. Four such cases are cited, in which the inflammation of the Onchocerca nodules preceded the development of typhoid or typhus. The author suggests that the inflammation of the cysts may precede in a similar way the development of other fevers. When inflammation appears, it does so practically always at the beginning of the course of such fevers and rarely

later, so that the inflammation of the onchocerca nodules may be erroneously regarded as the only cause of the febrile state.

G. Lapage.

KUITUNEN-EKBAUM (E.) & MORGAN (E. M.). **The Occurrence of Enterobius Vermicularis in the Appendix.**—*Canadian Public Health Jl.* 1942. July. Vol. 33. No. 7. pp. 340–343.

"1. One hundred surgically removed appendices from children of three months to fourteen years of age showed *Enterobius vermicularis* in 34 appendices, the incidence being 40 per cent. among 45 girls and 29 per cent. among 55 boys examined.

"2. No correlation was found to occur between the presence of *Enterobius vermicularis* and appendicitis. The parasite occurred in 27 normal appendices, in 5 acute, 1 chronic and 1 acute and chronic appendicitis.

"3. The largest number of pinworms, 290 specimens, was found in the normal appendix of a 5-year-old girl.

"4. Ova were found in 6 appendices, apparently released from the dead atrophied pinworms. The eggs were in the early stage of development.

"5. Faecaliths were found in 11 acute appendices and 1 normal appendix."

MELCHER (Leo R.) & CAMPBELL (Dan H.). **A Serologically Active Polysaccharide from** *Trichinella spiralis*.—*Science.* 1942. Nov. 6. Vol. 96. No. 2497. pp. 431–432.

Details are given of the preparation of the polysaccharide from worms liberated from hog muscle by peptic digestion; these must be sought in the original. The final product is a fine white powder which readily dissolves in water; it does not give protein reactions, but gives the Molisch test in very high dilutions. The polysaccharide is a good precipitating antigen, and gives precipitates in dilutions of 1 in 200,000 with sera from infected rabbits. Cross precipitation does not occur against *Ascaris suum, Nippostrongylus muris* or *Cysticercus taeniaeformis*. Positive skin reactions may be obtained in infected rabbits, but require 0·1 to 1·0 mgm. of material for good results. *C. W.*

MAUSS (Evelyn A.) & OTTO (G. F.). **The Occurrence of** *Trichinella spiralis* **Larvae in Tissues other than Skeletal Muscles.**—*Jl. Lab. & Clin. Med.* 1942. Aug. Vol. 27. No. 11. pp. 1384–1387.

This paper is reviewed in *Bulletin of Hygiene*, 1943, Vol. 18, p. 207.

MUMME (C.) & SUNDERMANN (A.). Zur Klinik der Trichinose. [**On the Clinical Picture of Trichiniasis.**]—*Muench. Med. Woch.* 1942. Aug. 28. Vol. 89. No. 35. pp. 758–760. With 2 figs.

This paper is reviewed in *Bulletin of Hygiene*, 1943, Vol. 18, p. 208.

POHLMANN (Elisabeth). Enzephalitis bei Trichinose. [**Encephalitis in Trichiniasis.**]—*Muench. Med. Woch.* 1942. Aug. 28. Vol. 89. No. 35. pp. 760–761. [14 refs.]

This paper is reviewed in *Bulletin of Hygiene*, 1943, Vol. 18, p. 208.

WHITTERIDGE (S. Morgan). **A Case of *Trichinella spiralis* Infection with Mental Symptoms.**—*Jl. Roy. Nav. Med. Serv.* 1942. July. Vol. 28. No. 3. pp. 290–293. With 1 chart.

This paper is reviewed in *Bulletin of Hygiene*, 1943, Vol. 18, p. 209.

GAASE (A.). Die Trichinoseforschung nach dem Schrifttum der letzten Jahre mit besonderer Berücksichtigung eigener Komplementbindungsergebnisse beim Menschen und in Tierversuchen. [**Investigations of Trichiniasis recorded in Recent Literature, with Special Consideration of the Author's Experiences with the Complement Fixation Reaction in Man and Animals.**]—*Deut. Militärarzt.* 1942. July. Vol. 7. No. 7. pp. 442–448. With 3 figs. [48 refs.]

This paper is reviewed in *Bulletin of Hygiene*, 1943, Vol. 18, p. 209.

GAASE (A.). Die Komplementbindungsreaktion auf Trichinose mit dem neuen Schweine-Antigen. [**The Complement Fixation Reaction in Trichiniasis with a New Pig Antigen.**]—*Muench. Med. Woch.* 1942. Aug. 28. Vol. 89. No. 35. pp. 761–762.

This paper is reviewed in *Bulletin of Hygiene*, 1943, Vol. 18, p. 210.

HAEMATOLOGY.

TROWELL (H. C.). **The Morphology of the Blood in Dimorphic Anaemia.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942. Nov. 30. Vol. 36. No. 3. pp. 151–176. With 1 diagram. [31 refs.]

Most cases of anaemia in Africans in Uganda show clear evidence of a dual deficiency, namely of iron and the factor concerned in nutritional macrocytic anaemia, and such dual deficiency anaemia, for which the name dimorphic anaemia is proposed, may well be the commonest anaemia of the tropics.

Dimorphic anaemia can be diagnosed in the majority of cases from examination of a well-stained and well-spread blood film. In the central portions of the smear hypochromic cells abound, a few are definitely microcytic and less than 5μ in diameter and anisocytosis is but slight. In the tail and edge of the smear the cells are well stained, often oval, they show no central pallor, some are macrocytic, exceeding 9μ in diameter, and polychromasia is present and may be very marked. It is because of the differential spreading of microcytes and macrocytes that a Price Jones curve taken at one part of the film may be misleading. The bone marrow smear shows megaloblastic, normoblastic and hypochromic erythropoiesis, the relative degrees depending on whether deficiency of the nutritional macrocytic anaemia factor or of iron predominates. Following the administration of iron in adequate doses there is a reticulocyte response and one of the easiest tests for dimorphic anaemia is to observe whether, when this response has subsided, crude liver extract will produce a second reticulocytosis.

The commonest cause of deficiency of the nutritional macrocytic factor appeared to be a diet poor in meat and possibly in green vegetables, while the cause of the iron deficiency appeared to be a heavy hookworm load and a diet deficient in iron. *F. Murgatroyd.*

DERMATOLOGY AND FUNGOUS DISEASES.

AGUIRRE PEQUEÑO (Eduardo). Mal del pinto. (Auto-observación.) "Empeines" o "jiotes." Lesiones de principio. Ensayo crítico. [**Pinta.**]—*Medicina.* Mexico. 1942. Nov. 25. Vol. 22. No. 424. pp. 542–590. With 5 figs. [83 refs.] English summary.

As the full title of this article in the original shows, the author has written a critical essay on *mal del pinto*, particularly on the early manifestations, and has carried out inoculations on himself and observed the results for over two years. The article is a discussion of the history of the disease going back to Hernandez' account of it published in Mexico in 1615 and bringing the tale down to 1942. Apart from the historic narrative, which is of transcendent interest, there is little to concern readers of this *Bulletin*. The clinical aspect of the findings, confirmed by the author's experiments on himself, clarify some of the doubts as to the singleness of the disease, or "clinical entity" as some prefer.

The author divides the course of the disease, as has been customary, into three periods: The first is that of the primary lesion or pinta chancre, called locally *empeine* or *jiota*. The term "empeine" really means a skin eruption, usually of a ringworm character. The French *dartre*, sometimes used, has the same significance. The second is that of dissemination of lesions; this has several synonyms, the commonest being *empeines* (in the plural) or *jiotes*; quite recently the term pintids has been given to these secondary lesions. Other names which may be mentioned for this stage are caratides or, on the analogy of the syphilitic rash, the roseola period. The third stage is that of the pigmentary changes, either development of various coloured lesions or achromatic sites, classed together as the dyschromic stage. The paper is well documented throughout and there is an excellent bibliographical reference list. *H. Harold Scott.*

PALMER (Alice E.), AMOLSCH (Arthur L.) & SHAFFER (Loren W.). **Histoplasmosis with Mucocutaneous Manifestations. Report of a Case.**—*Arch. Dermat. & Syph.* 1942. May. Vol. 45. No. 5. pp. 912–916. With 2 figs.

The case described is an unusual one, as the lesions appeared to be limited to ulceration of the lip, buccal and pharyngeal mucosa, anal region, penis and larynx, and the suprarenals. There was not extensive involvement of the reticulo-endothelial system, throughout the body, which is a common feature of the majority of cases reported. The organism was demonstrated in biopsy material removed from the lesions near the mouth and anus. The patient had also a large aneurysm of the ascending aorta and had been receiving energetic arsenic and bismuth anti-syphilitic treatment. When the correct diagnosis was arrived at, a course of antimony in the form of neostam was administered. This was followed by sulphathiazole. There was no improvement. The patient became weaker and died. At the post-mortem examination the suprarenals were enlarged and the glandular material was almost entirely replaced by caseous-like areas. The most careful search failed to reveal any of the organisms, in spite of the fact that they had been found during life in biopsy material and had been

successfully cultivated and inoculated to mice. It would seem that they had either disappeared after death or had been eliminated by the therapeutic measures taken. *C. M. Wenyon.*

PARSONS (Robert J.). **Experimental Histoplasmosis in Mice.**—*Arch. Pathology.* 1942. July. Vol. 34. No. 1. pp. 229–239. With 2 figs. [Refs. in footnotes.]

The paper describes experiments with *Histoplasma capsulatum* isolated from an ulcer of the nares. The medium inoculated was a dextrose tartaric acid medium, the culture being maintained at room temperature. On this medium or on Sabouraud's medium the organism grows for two or three months in the mycelial form, throwing up hyphae upon which develop chlamydospores. The author shows that if this mycelial stage is ground up in dextrose infusion broth and is injected intravenously into young mice in a dose of 0·05 to 0·2 cc., a generalized infection of the yeast-like form develops, all organs containing numbers of parasites in cells of the hypertrophied reticulo-endothelial system. If the organism is grown on media at body temperature, culture of the yeast-like form is obtained and this, injected intravenously into mice, also gives rise to a generalized infection of similar forms. Injection of the mycelial form intraperitoneally does not give rise to generalized infection, though locally yeast-like forms can be detected in small numbers. Culture of material from the peritoneal cavity at body temperature will yield cultures of the yeast-like stage. It is thus possible by intravenous or intraperitoneal injection of young mice to transform the mycelial stage into the yeast-like pathogenic form which is characteristic of the naturally occurring disease in man and animals. Suspensions of the liver and spleen of infected mice regularly produce generalized infections in young mice after intravenous injection. Similarly, the author has succeeded on two occasions in infecting young mice by injection of suspensions of lymph nodes removed surgically from one of his patients. It would seem that for the isolation of the organism from certain contaminated lesions the inoculation of mice offers advantages over culture, for the mice show a tendency to inhibit or destroy contaminating organisms which interfere with successful culture.

The paper, which is illustrated by microphotographs, is a useful one from the point of view of diagnosis, as certain of the procedures described may be of use for the isolation of the fungus from human cases of histoplasmosis. *C. M. Wenyon.*

MISCELLANEOUS.

ERASMUS (J. F. P.). **Tropical Surgery in the East African Campaign.**—*South African Med. Jl.* 1942. Nov. 14. Vol. 16. No. 21. pp. 379–382.

The author discusses certain surgical conditions peculiar to hot climates, the cases from which his experience is drawn occurred in native troops from East and West Africa and in Ethiopians. Under the conditions of the East African campaign ulcers were common. These are divisible into two categories :—those due to chiggers, and

tropical ulcers. As is well known, chiggers may give rise to extensive injuries if appropriate treatment is not given at an early stage. Of the tropical ulcers the author observes that in every case a history of trauma was obtained, and points out that no case was seen in the West African troops whose rations were supplemented by a generous supply of palm oil and nuts; nevertheless, the aetiology of these ulcers is obscure. He found that excision of the ulcer after separation of sloughs, followed by the implantation of pinch grafts a week later, was the most satisfactory method of treatment.

Pyomyositis was not rare; 41 cases are reported. The author agrees with those investigators who have been unable to associate this condition with filariasis; in every case in the present series *Staphylococcus aureus* was found. He describes an acute non-suppurative stage, which may resolve under conservative treatment, but in the majority of cases deep-seated abscesses were present which required wide incision. Many of these abscesses were loculated. The common sites were the quadriceps and gluteal muscles, but muscles of the arm, abdomen, thorax and neck were occasionally affected. These abscesses frequently give rise to difficulty in diagnosis, and have been mistaken for cellulitis, septic arthritis, perinephric abscess and fibro-sarcoma.

Filariasis is discussed at some length, and the surgical conditions arising from lymphangitis and lymphatic obstruction are described. These descriptions confirm most of the well-known work on the subject, but mention may be made of the fact that the author reports two cases of intra-abdominal abscess which could not be explained except on an underlying filarial basis. Abdominal pain and filarial fever, due to iliac adenitis and lymphangitis, may cause difficulty in diagnosis; laparotomy has been performed on these findings.

Malaria is important; trivial injuries commonly precipitate attacks in chronic sufferers. If operation is to be performed in such people it is well to give a course of quinine beforehand; a few grains given just before operation have proved useless. Almost any acute abdominal condition may be simulated by malaria, but it is to be noted that, in the author's experience, abdominal malaria was not usually accompanied by diarrhoea. In the treatment of ruptured spleen great value has been found in the procedure of transfusion of blood collected from the peritoneal cavity. This blood is not usually clotted except round the raw surface of the spleen. It should be strained through sterile gauze, citrated and injected in the normal manner.

In urological surgery the commonest underlying cause of disease was bilharzia. Guinea-worm was very common in West African troops. Crab yaws frequently led to disability in these soldiers. The commonest cause of enlargement of the spleen, except malaria, was kala azar. Undulant fever, giving rise to joint lesions and orchitis, was seen in French African troops who had served in Syria.

C. W.

DOUCET. Note préliminaire sur le traitement des ulcères phagédéniques tropicaux par la bile de boeuf stérilisée. [**The Treatment of Phagedaenic Ulcer with Sterile Ox-Bile. Preliminary Note.**]—*Ann. Soc. Belge de Méd. Trop.* 1940. Sept. 30. Vol. 20. No. 3. pp. 245–247.

The method is to pour on to the ulcers sterile ox-bile, or to use a dressing saturated with the ox-bile, twice daily. The bile appears to

digest sloughs and discharges and the bed of the ulcer soon acquires a healthy appearance ; healing commences rapidly and is usually uninterrupted. The bile has an analgesic action which is appreciated by the patients. There are no adverse effects. The author considers this treatment to be as good as others generally used, but points out that it is most valuable in small, recent ulcers. His experience was gained from the treatment of 20 cases. *C. W.*

TEY (Antenor), CRISCUOLO (Enso) & MARHUENDA (Perfecto). Le traitement des ulcères torpides cutanées par la vitamine C. [**The Treatment of Chronic Ulcers by Vitamin C.**]—*Schweiz. Med. Woch.* 1942. Nov. 7. Vol. 72. No. 45. pp. 1242–1245. [36 refs.]

The ulcers originated in small wounds, and were situated for the most part on the legs ; they had long resisted routine treatment. Syphilis, diabetes, renal disease and varicose veins were not factors. The authors found that in the 15 patients recorded there were required, on the average, 3,066 mgm. ascorbic acid to effect saturation, a figure greatly in excess of the normal, and it was in the course of investigation of the deficiency of vitamin C by this method that surprisingly rapid healing of the ulcers took place, often within a few days. The method appears to have been to saturate the patient ; in one case it is noted that 400 mgm. were given daily, but in the other cases the full saturation dose is quoted without details of administration. Healing took place in 3–10 days.

The authors discuss the possible mode of action of ascorbic acid, and refer to its influence in the healing of wounds. [Perhaps this method may have a use in the treatment of chronic ulcers in the tropics.] *C. W.*

REITLER (Rudolph) & BTESH (Simon). **Studies on Hepato-Lienal Cirrhosis in Eastern Mediterranean Countries.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942. Nov. 30. Vol. 36. No. 3. pp. 177–188. With 2 figs. on 1 plate. [21 refs.]

The disease usually starts in early adult life with moderate enlargement of the liver and periods of irregular fever. The spleen may be just palpable and the blood picture is not characteristic. As the disease progresses the spleen gradually enlarges and a second stage is reached characterized by general debility, abdominal pain, cough and at times mild haemoptysis. There is slight enlargment of the heart, the skin is pale and there may be pellagroid rashes. The blood shows a leucopenia, hypochromic anaemia and thrombocytopenia and the sedimentation rate is very rapid. After some years a third stage is reached when the mechanical effects of cirrhosis become paramount. Ascites develops, haematemesis is common, the spleen is enormous while the liver may be large or it may have shrunk. This stage lasts for one to three years, and death usually occurs from some intercurrent infection. The pathological lesion is a periportal cirrhosis without appreciable damage to the liver cells or the lobular structure.

Malaria, leishmaniasis, schistosomiasis, syphilis and alcohol appear to be excluded as causal factors and the most remarkable aetiological feature is the association with intestinal parasites. Routine examinations of all hospital patients showed 17 per cent. to have intestinal helminths, whereas among those suffering from hepato-lienal cirrhosis

the figure was 47 per cent., and 12 per cent. also harboured *E. histolytica.* As the clinical picture suggested an infection, blood cultures were carried out. During the afebrile periods these were invariably negative, but during fever strains of *Staphylococcus pyogenes* (*aureus* and *albus*) were recovered from five patients. On inoculation into rabbits these strains varied in pathogenicity, and one of the least pathogenic was used in an attempt to reproduce the disease experimentally. Animals killed one to two months after one or two intravenous injections of this strain showed chronic interstitial pneumonia, reduction in the number of Malpighian bodies of the spleen with enlargement of the sinuses and thickening of the trabeculae, while the liver showed strictly periportal infiltrations and only very scanty islets of vacuolized liver cells without infiltrations within the lobules. The appearances were similar to those found in human cases. In contrast, injections of enterococci, as controls, while producing changes in the lungs and spleen similar to those produced by staphylococci, resulted in multiple miliary abscess in the liver in the intralobular as well as in the perilobular tissue.

Intestinal parasitic infections are common to all strata of the population but hepato-lienal cirrhosis is mainly found amongst the poorer rural classes, whose diet appeared poor in vitamin A and in proteins. Furthermore, two patients had xerophthalmia and several had pellagroid rashes, and it is suggested that Mediterranean hepato-lienal cirrhosis is due to staphylococci which gain entrance to the blood stream through minute injuries of the intestinal mucosa caused by intestinal parasites, and that the development of the disease is aided by nutritional deficiencies. *F. Murgatroyd.*

LEWIS (D. J.). **A Method of transporting Living Mosquito Larvae.**—*Bull. Entom. Res.* 1942. Dec. Vol. 33. Pt. 4. pp. 227–228. With 1 fig.

Larvae stranded on a wet surface in a cool damp atmosphere can be carried alive for many hours or even several days. Perforated trays are made from petrol tins and are lined with cloth. Water containing the larvae is poured in, the water drains away, leaving the larvae stranded. A metal cross-piece laid on the tray serves to support another tray placed upon it ; eight such trays can be placed in a four-gallon petrol tin which is closed with a lid and, in hot weather, wrapped in a wet towel. If gelatinous algae are present in the water they should be removed, since they form a layer which kills the larvae.

The author has used this procedure successfully in the Sudan.

C. W.

KOMP (W. H. W.). **A Technique for staining, dissecting, and mounting the Male Terminalia of Mosquitoes.**—*Public Health Rep.* 1942. Sept. 4. Vol. 57. No. 36. pp. 1327–1333. With 2 figs. on 1 plate.

The author points out that in many critical cases the identification of mosquitoes may depend on the study of the external sexual organs of the male : also that though much may be seen by mounting these organs *en bloc* in balsam it is often desirable to dissect them. He then proceeds to describe in detail his methods for staining, dissecting and mounting these organs.

The paper is not one which lends itself to being summarized, and attention can be called to one or two points only. The specimens are stained slowly, after treatment with sodium hydroxide, in a dilute acid fuchsin solution. They are then dehydrated and transferred to clove oil in which they are dissected. Long immersion in clove oil makes the specimen brittle, which may be advantageous. For dissection the author uses the smallest size of stainless steel insect pin, ground down on a revolving stone under a binocular microscope. In dissection the needle holders are mounted on the stage of the microscope in pillars of plasticine, which makes their movements very steady. In order to be able to examine both sides of the specimen, a special type of microscope slide made of aluminium has been devised. In the centre of it there is a circular hole, slightly recessed, and closed by a cover slip. The author mounts the various parts of the male organs in order in separate drops of balsam on this cover slip, allows the balsam to dry and then covers the whole with a second cover slip.

It is evident that these methods might be of great value in the study of other small chitinous objects. *P. A. Buxton.*

PROCEEDINGS OF THE NEW JERSEY MOSQUITO EXTERMINATION ASSOCIATION. 1940. Vol. 27. pp. 203+3. With 9 plates. 1941. Vol. 28. pp. 211+3. With 8 plates. 1942. Vol. 29. pp. 166+4. With 14 plates.—[**Mosquito Control Work in 1938–41.**] [From summary in *Rev. Applied Entom.* Ser. B. 1942. Dec. Vol. 30. Pt. 12. pp. 187–190.]

In "Studies of the Effect of Reduction of Surface Tension on Mosquito Pupae," by M. A. MANZELLI [Vol. 28, pp. 19–23, 3 figs.], descriptions are given of the functions of the respiratory trumpets of a mosquito pupa, the tips of which normally protrude through the surface film of water and are held there by surface tension, enabling the pupa to keep its balance, although the top is the heavier part, and the mechanism that makes submergence possible. When the surface tension of water is reduced by the addition of a wetting agent, all the pupae in it turn on their sides and die in a few hours. Their inability to maintain their equilibrum is not attributable to any toxic action of the chemical, as pupae transferred to fresh water after three minutes in water treated with 1 part actual soap per 100, 200, 400 or 1,000 became normal at once. However, while those that had been in the water containing the two lowest concentrations of soap remained normal, the other two batches died, so that toxic action was involved in the higher concentrations. All pupae that were allowed to remain in any of the soap solutions died. Reduction of surface tension would also cause any egg raft or any female alighting on water for oviposition to sink and would kill larvae that managed to hatch. The use of wetting agents for mosquito control is therefore suggested in places, such as barrels, where additional dilution cannot occur. A neutral wetting agent is desirable, as soap might combine with other substances in the water to form an insoluble material. [See also this *Bulletin*, 1942, Vol. 39, p. 427.]

"Comparative Resistance of Several Species of Mosquitoes to Larvicides," by H. H. STAGE and W. W. YATES [Vol. 28, pp. 119–126, 1 fig.], deals with experiments on the toxicity of a pyrethrum larvicide (an emulsion of oil containing pyrethrum extract), a light Diesel oil, phenothiazine [a solution consisting of 1 part thiodiphenylamine,

20 parts commercial sulphonated petroleum oil and 5 parts acetone], and a Paris green dust to the predominant species of *Aedës*, *Culex*, *Theobaldia* and *Anopheles* occurring in the Pacific North-west. Larvae of the four genera showed considerable differences in their resistance to the larvicides in laboratory tests. *Aëdes* and *Anopheles* were the least resistant to Diesel oil and *Culex* the most resistant, *Aëdes* the least resistant to the pyrethrum larvicide and *Anopheles* the most so, *Anopheles* the least resistant to phenothiazine and Paris green, *Theobaldia* the most resistant to phenothiazine and the pyrethrum larvicide, and *Culex* the most resistant to Paris green. Larvae of *Aëdes vexans*, Mg., were slightly but consistently more resistant to Diesel oil, the pyrethrum larvicide and Paris green than were those of *A. lateralis*, Mg. Larvae of *C. pipiens*, L., and *C. tarsalis*, Coq., showed about the same degree of resistance to the larvicides other than Paris green, to which *C. pipiens* was the more resistant. Although there were inconsistencies in the rate of kill, it appeared that the four instars of *Aëdes*, *Culex* and *Theobaldia* became progressively more resistant to larvicides after each moult, but there appeared to be a period just before pupation when resistance was lowered. This period was least marked in *Aëdes* ; *Anopheles* was not tested. *Aëdes* and *Culex* pupae were more resistant to the pyrethrum larvicide than to Diesel oil. *Culex* pupae were somewhat more resistant to Diesel oil and far more resistant to the other larvicides than *Aëdes* and *Theobaldia* pupae. *Theobaldia* larvae and pupae were killed in about equal percentages by the larvicides used.

In " Factors that may affect the Toxicity of Pyrethrum-oil Emulsions as Mosquito Larvicides," also by YATES and STAGE [Vol. 28, pp. 127–135], tests designed to ascertain the reason for the inconsistency sometimes shown in results obtained with emulsions of oil containing pyrethrum extract are described. The emulsions contained 66 per cent. oil and were diluted with nine parts water for application. Typical third- and fourth-instar larvae of *Aëdes vexans*, Mg., and *A. lateralis*, Mg., or *Theobaldia incidens*, Thoms., were used, and the tests were carried out at 75°F. The standard emulsion was emulsified with 1 per cent. potassium coconut-oil soap. Of other emulsifiers tested, triethanolamine oleate at 3·6 per cent. produced an excellent emulsion, but reduced toxicity by at least 10 per cent. ; the same substance at 2 per cent. gave an emulsion comparable in character and toxicity with the standard. Calcium caseinate, blood albumin, egg albumin, sodium silicate and bentonite were all tested at a concentration of 2 per cent. Calcium caseinate and bentonite made stable but viscous emulsions, which broke too quickly when diluted to be satisfactory ; the albumins and sodium silicate made unstable emulsions that soon deteriorated. The albumins and calcium caseinate reduced the kill of mosquito larvae by from 10 to 25 per cent. ; bentonite and sodium silicate did not reduce toxicity. Waste liquors (fatty acids and liquid resins) produced by paper mills using pine woods were tested at 1 and 2 per cent. and gave emulsions that were equal in every respect to the standard if 1 per cent. sodium hydroxide was added. Sulphated alkylated diphenyl, sodium lauryl sulphate, a sodium salt of an alkylated naphthalene sulphonate and several oil-soluble emulsifiers all made satisfactory emulsions, and their toxicity compared favourably with the standard soap emulsion. Soap emulsions prepared with 0·75 or 1·5 per cent. dry coconut-oil soap, 1 per cent. potassium fish-oil soap or 0·75 per cent. dry coconut-oil soap, to which 1 per cent.

sodium hydroxide was added were all satisfactory in physical structure and gave satisfactory kills. The addition of 1 per cent. of sodium hydroxide did not appear to aid the emulsion in any way except when used with hard or impure water, when it retarded the breaking down of the emulsion. No appreciable difference in toxicity was observed between emulsions prepared with Diesel oil, stove oil and kerosene, the specifications of which are given. Several activators, including 18 organic compounds, mostly oils, were tested with the emulsion, but since the best of them increased its toxicity only moderately, it is doubtful whether their use would be economical. Concentrated standard emulsions were stored at 70°F. for several years without losing their toxicity. Emulsions stored at 100°F. broke down and lost their toxicity after a few weeks. Those stored at 35°F. deteriorated much more slowly. Laboratory tests showed that the toxicity of the emulsion is greatly reduced in water having a temperature below 60°F. The point at which the kill was greatly accelerated lay between 60 and 63°F. for *Aëdes* larvae and between 65 and 68°F. for *Theobaldia* larvae. Heavily polluted water and water containing large amounts of débris required substantially larger amounts of the emulsion per acre to effect satisfactory kills than clear water. Having been treated with 50–60 U.S. gals. diluted emulsion per acre, they had to be re-treated before kill was satisfactory.

"Experiments with three Types of Pyrethrum Oil Emulsions of the New Jersey Mosquito Larvicide," by J. M. GINSBURG [Vol. 29. pp. 159–162, 1 plate], deals with tests of the New Jersey larvicide [a stable emulsion of approximately 66 per cent. oil-pyrethrum extract about 34 per cent. water and 0·5 per cent. emulsifier], modified by omitting the water and using emulsifiers soluble in the oil. Such a change would eliminate the danger of freezing during winter storage and reduce volume for storage and transport. If 1–4 per cent. of the emulsifier is incorporated, a quick-breaking emulsion results, and with 15–25 per cent. emulsifier a permanent or water-miscible oil emulsion is obtained. The tests, which were made with a stable emulsion (the New Jersey larvicide), a quick-breaking emulsion and a permanent emulsion, all mixed with water for application in proportions to give concentrations of 6·6 per cent. oil and 0·007 per cent. pyrethrins, dealt with the relationship between the nature of the oil film deposited on water and toxicity to mosquito larvae (third and fourth instars of *Aëdes aegypti*, L.). All were applied at 50 U.S. gals. per acre to small dishes of water. The stable emulsion produced the most uniform surface film, with oil droplets averaging 3 microns in diameter, and gave 100 per cent. kill. The quick-breaking emulsion, which had an average oil droplet size of 15 microns, gave only 80–90 per cent. kill, and the miscible oil, the droplets of which were smaller than 1 micron, only 65–70 per cent.

SULLIVAN (W. N.), GOODHUE (L. D.) & FALES (J. H.). **Toxicity to Adult Mosquitoes of Aerosols produced by Spraying Solutions of Insecticides in Liquefied Gas.**—*Jl. Econom. Entom.* 1942. Feb. Vol. 35. No. 1. pp. 48–51. With 1 fig.

Insecticidal sprays as used against mosquitoes are usually produced by hand atomizers or by power equipment. The mist produced is

generally rather coarse and most has settled out in two or three minutes and fails to reach insects in protected places. In this paper the authors describe an ingenious method by which the insecticide is dispersed in colloidal or " aerosol " form without the use of power. The insecticide (in this case pyrethrum extract plus sesame oil as an activator) is mixed with liquefied dichlorodifluoromethane (a gas used in refrigerating plants) and introduced into a suitable container provided with a fine nozzle. If the nozzle is opened and the container so held that the liquid comes in contact with the orifice, the mixture is expelled at a pressure equal to the vapour pressure of the solvent. In the case of dichlorodifluoromethane this is 82 pounds per square inch at 20°C. The solvent immediately evaporates and leaves the insecticide in colloidal suspension. The dosage is controlled by opening the nozzle for measured periods of time, depending on the space to be treated. Good results were obtained against mosquitoes, and, using heavier doses, bed bugs, cockroaches and flies. The insecticide is shown to settle out of the atmosphere far more slowly than a kerosene mist. The solvent is non-inflammable, non-poisonous, non-staining and has no disagreeable odour. The method should, therefore, be particularly valuable for the destruction of mosquitoes in aircraft.

V. B. Wigglesworth.

McGovran (E. R.) & Sullivan (W. N.). **Two Activators for Pyrethrins in Fly Sprays.**—*Jl. Econom. Entom.* 1942. Oct. Vol. 35. No. 5. p. 792.

The two activators are methylphenylnitrosoamine and 2,4 diamylcyclohexanol ; 3 per cent. of the former and 5 per cent. of the latter, in refined petroleum oil sprays containing 0·5 mgm. of pyrethrins per cc., gave significant increases in mortality in house flies over the standard pyrethrins in oil used as control. The former is a light brown liquid with a noticeable odour and the spray becomes brownish in the light after a few weeks ; it is more efficient than the latter, which has no colour or smell. Both were obtained from commercial sources.

C. W.

Dubarry & Giraud-Costa. Fièvre de trois jours et éruption due aux piqûres réitérées de phlébotomes (Harara). [**Sandfly Fever and Harara, an Eruption due to Repeated Bites of Phlebotomus.**]—*Bull. Soc. Path. Exot.* 1941. Vol. 34. pp. 142–153. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Dec. Vol. 30. Pt. 12. p. 177.]

The authors describe the dermatitis known as Harara in Palestine, and conclude that it is a reaction produced by repeated bites of sandflies in persons who have recently come to the country and have not been long exposed to them. The frequent and simultaneous occurrence of Harara and sandfly (three-day) fever is due to the fact that *Phlebotomus papatasii*, Scop.], the bites of which cause Harara, is also the vector of the fever, but Harara is not, as has been assumed, an exanthematic form of sandfly fever, nor is it an abnormal form of dengue. [See also this *Bulletin*, 1942, Vol. 39, p. 577.]

MARCHIONINI (A.). Zur Klimatophysiologie und -pathologie der Haut. III. Mitt. Die Phlebotomenepizoonose (sog. Harara) in Anatolien. [**On the Climatological and Pathological Physiology of the Skin. The Affection due to Phlebotomus (known as Harara) in Anatolia.**]—*Arch. f. Dermat. u. Syph.* 1941. Vol. 182. pp. 127–173. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Dec. Vol. 30. Pt. 12. p. 178.]

Numerous cases of Harara occur in Anatolia, Syria and Palestine during the summer, starting at the beginning of the flight period of *Phlebotomus* in the second half of May. Clinical data are given. The species of *Phlebotomus* in Anatolia are *P. papatasii*, Scop., *P. perniciosus*, Newst., *P. minutus*, Rond., and *P. sergenti*, Parrot; the dermatitis is mainly due to *P. papatasii* and was observed to be most prevalent in months in which the temperature favours the development of this sandfly.

BIGHAM (John T.). *Hippelates* (**Eye Gnat**) **Investigations in the South-eastern States.**—*Jl. Econom. Entom.* 1941. June. Vol. 34. No. 3. pp. 439–444. [13 refs.]

The "eye gnats" (Hippelates) of the warmer parts of America are closely related to the "eye flies" (Siphunculina) of Assam and other areas in S.E. Asia. They are extremely irritating and annoying, hovering round the eyes and feeding on the edge of the lids and other moist areas. Both in America and Asia insects of this type are often stated to transmit epidemic conjunctivitis; indeed it seems probable that they do so. In the present paper the author adds greatly to our knowledge of the biology of the principal species in the S.E. United States (*H. pusio*).

The author carried out an extensive survey in September and October in several of the south-eastern States, Florida, Texas, Georgia, etc. He found that the flies were invariably absent from areas of heavy or clay soil. They were abundant and troublesome on light soil, but only if the surface of the earth was bare, as it is in certain orange groves and in market gardens. It was observed that "the gnats are not found at places given over entirely to cattle raising or to the tourist trade."

He then carried out an extensive series of observations with traps which were fitted close to the ground and which collected flies emerging from a certain area. [The text clearly states that the area was 1 sq. ft., but the author more than once refers to the area as 1 sq. yd. The figures for the possible numbers emerging per acre may therefore be misleading.] Placing these traps over soil which had been dug or disturbed, he obtained anything up to 500 flies per trap, with an average of 24, the work being done at a time when emergence was beginning to come to an end. From similar traps set in pine woods, or over grass or rotting vegetation, and in a number of other specified environments, no eye gnats were recovered. It appears also to have been demonstrated that within a few hours of land being ploughed, large numbers of eggs were being laid in it but that very few were laid after the first week.

Evidence of another type was obtained by trapping adults, which were persuaded to enter a trap by a bait of decomposed liver and urea. In favourable places, such as areas devoted to raising celery or citrus

crops, provided the ground was worked and not covered with grass, 60,000 to 100,000 of these gnats might be taken in a week. But in forest or grazing land very few, or even none, would be taken.

It is evident that where it is abundant the insect is a most serious pest. The author speaks of school teachers making use of repellents and fly sprays, and of school houses being screened.

P. A. Buxton.

TURNBULL (Frederick Myles) & FRANKLIN (L. Ben). **Aural Infestation with Screw Worms.**—*Jl. Amer. Med. Assoc.* 1942. Sept. 12. Vol. 120. No. 2. pp. 117–119. With 3 figs.

The authors describe a single case from the start. The patient had suffered from chronic middle ear disease and infected mastoid. She was attacked by *Cochliomyia hominivorax* (apparently one only), which doubtless left larvae in the ear. A serous bloodstained liquid came from the ear 12 hours later. In all, 39 larvae were recovered by syringing.

P. A. Buxton.

HEDGES (H. S.) & HUMPHRIES (M. K.), Jr. **Conjunctival Myiasis due to** *Oestrus ovis.* **Report of a Case.**—*Arch. Ophthalmology.* 1942. Aug. Vol. 28. No. 2. pp. 251–253. With 1 fig. [10 refs.]

BOOK REVIEWS.

ROCKEFELLER FOUNDATION. INTERNATIONAL HEALTH DIVISION. **Annual Report 1941.**—pp. ix+244. With 10 figs. on 6 plates. New York : 49 West 49th Street.

In spite of the difficulties entailed by the second World War, the International Health Division of the Rockefeller Foundation has, as their report shows, accomplished a wonderful amount of useful and beneficial work, the most important being in connexion with yellow fever, influenza, malaria, typhus, diphtheria, viruses and nutrition. These make up an imposing list of activities under conditions of world unrest, but there were yet other matters to which attention was given and in which research and epidemiological studies were undertaken, for example, rabies, syphilis, tuberculosis and mental hygiene—all this apart from aid to various health services, schools of hygiene, training institutions and public health education generally. In the following remarks an endeavour will be made to indicate the main lines of progress in the more important subjects.

The writers of the Report state in the opening sentences : "Since both research and development of public health organizations are long-time projects there is of necessity a great similarity in the Division's activities from year to year." If this is so it can be only under widely comprehensive groupings, for new researches open up new vistas and new sites for trying out results and emphasize how great may be the "diversity in unity."

Starting, then, with *yellow fever*. An immunity survey showed, in 1936, that many in the south-western Anglo-Egyptian Sudan and some in the north and north-west of Uganda had acquired immunity. Early in 1937, fifty-four sera from adults in Bwamba County, Uganda, were examined and 25 gave a positive result. Nevertheless, clinical yellow fever was not observed. In two years, 1938–39, none of 127 specimens of liver obtained by viscerotomy showed the changes due to yellow fever, nevertheless more young children were found immune. Obviously the majority of cases were mild. Six localities were then studied and two clinical cases found and a strain of virus isolated from one of them. The year 1940 marked the end of a seven-year period of outbreaks of jungle yellow fever in South Brazil, Paraguay and the Argentine. Rio Grande do Sul lies well beyond the traditional range of *Aëdes aegypti* and the appearance of yellow fever there was a surprise and showed that jungle yellow fever can persist over the winter months under climatic conditions which would prevent *aegypti*-transmitted disease. The Valle do Chanaan, where jungle yellow fever was first described in 1932, was again invaded after an interval of eight years, and in 1941 jungle yellow fever appeared in that part of Venezuela where *aegypti*-transmitted disease (but of jungle origin) had been noted 12 years before.

During April and May of the year under review 1,264 blood sera were tested in 30 localities in eastern Panama and 50 were found positive, among them sera from a girl of 7 and a boy of 9 years.

Since 1935 the International Health Division had been co-operating with South American governments in a combined laboratory, clinical, entomological and zoological study to clear up the origin of jungle yellow fever. In S. America it appears to be a disease of animals, especially primates and marsupials, and to be transmitted, mainly at least, by the mosquito *Haemagogus capricorni*, a metallic-looking, blue-black insect which lives in the forest and oviposits in water-holes in trees. In December 1940 and the following month the virus was found five times in specimens of this mosquito caught in the wild. At this time of the year it cannot be found at ground level, but lives in the tree-tops [see this *Bulletin*, 1942, Vol. 39, p. 615].

Control was undertaken in various districts after the Sudan outbreak, notably in Uganda, around Bwamba (more than 100,000 were vaccinated); in Kenya mass vaccination is being performed, also in French Equatorial Africa and the Belgian Congo. There having been no important outbreaks of yellow fever in Brazil in 1941, preventive-inoculation there was on a smaller scale, but many in Bolivia, Peru and Colombia were vaccinated.

Research has been taken in hand to elucidate the problem of the jaundice which has followed yellow fever immunization. It is probably due to a virus introduced into the vaccine with the "normal" human serum. Hence studies have been conducted towards preparing a satisfactory vaccine without any serum. These have led to the use of chicken embryo, and vaccines prepared from infective chick juice can be diluted to 10 per cent. with saline without appreciable loss of activity.

Much work has been done in investigating *influenza* and considerable additions to medical knowledge have accrued therefrom. The term "influenza" implies rather a clinical syndrome than a clearly defined disease with determined aetiology. A number of outbreaks have been investigated and the results indicate that the aetiology is diverse and

more than one aetiological variety may occur in a single outbreak. Moreover, highly developed antibodies to influenza virus A do not reduce the frequency of influenza B, nor *vice versa*. Eight strains of virus A were isolated from patients in the Hawaian Islands and California ; their antigenic compositions were similar and closely related to those isolated in 1929 in New York. Vaccines were prepared and their effectiveness was found to vary considerably. The reduction of cases was 19 per cent. in Florida groups, 50 per cent. in Alabama ; in three out of eleven institutions where they were tried there was no reduction in incidence. It was found possible to give 10–100 times as much antigen, if the virus was concentrated in chicken embryo allantoic fluid, as had been given in the complex vaccine of the previous year, and this naturally produced a significant increase in antibody response. Also, the new virus could be inactivated by heat or formalin without reduction of its antigenic potency. Fortunately the same principles as applied to the A virus were found to hold true of the virus B. In research on immunization by influenza virus vaccines three types of preparation were compared : (1) Virus grown in tissue cultures, minced chick embryo. (2) Allantoic fluid and chorio-allantoic membrane of chick embryos inoculated into the allantoic sac. (3) Complex influenza A-distemper vaccine made from chick embryo suspensions. The antibody response to these was compared with that from natural infection and the latter was found to be superior to the first and third, but the virus B vaccine prepared in the second manner gave a response almost equal to that resulting from an attack. Plans have been made to test the virus suspensions as a vaccine on a large scale in Oklahoma, Georgia, Virginia, Ohio and New York.

Other studies, into which we cannot enter in detail here, were undertaken, in co-operation with the Minnesota State Department of Health, the New York University College of Medicine and the University of Michigan School of Public Health, into the efficacy of intranasal vaccination. It was found that in nasal secretions there is a virus-inactivating substance with antibody characteristics. Epidemiological studies were also carried out at the Bacteriological Institute, Buenos Aires, with the co-operation of the Argentine Health authorities.

Important findings have resulted from work on *rabies* and the significance of the Negri body in the diagnosis and epidemiology of the disease. Studies with different groups of animals might reveal anything from 10 to 50 per cent. positive by inoculation tests but negative for Negri bodies. The type of disease also plays a part ; for example, 21·4 per cent. of dogs with the rabid form, but 52 per cent. of those with the paralytic form, were Negri negative. Animal inoculation, though it takes longer, is much more accurate for diagnosis than the microscopic method.

Other studies included research into various viruses of *encephalitis*—St. Louis, Japanese B, and a West Nile virus. In *typhus fever* two main objectives were the evaluation of available vaccines and improvement in laboratory experimental methods. The Eastern cotton rat (*Sigmodon hispidus hispidus*) proved a much more susceptible animal than the guineapig hitherto used.

On certain aspects of *malaria* much work was done, particularly (from the research aspect) in finding parasiticidal drugs and in studying biological races of mosquitoes. Many drugs relieve the clinical symptoms but leave parasites in the blood, which may bring about a

relapse, or the patient may become a gametocyte carrier—a potential mosquito-infector. As for prophylaxis, other drugs, though they may prevent the development of clinical malaria, do not prevent infection. The study for an efficacious synthetic drug is all the more important at a time like the present when non-immune troops, refugees and others may be moving through malarious districts and quinine is almost unobtainable. Of more than 80 drugs examined and tested two were found to be distinctly antimalarial in action: one a sulphone, p, p′-diacetyldiaminodiphenylsulphone, and a closely related compound, promin, with composition sodium p,p′-diaminodiphenylsulphone N,N′-didextrose sulphonate. Even with the latter the results were not very satisfactory; it seemed to work better in negroes than in white people. Sulphadiazine checked the clinical course in 10 out of 13 negroes with acute malaria (one quartan, five subtertian and seven benign tertian infections), but had no effect in the other three. Promin has to be given intravenously and is excreted very quickly. At present none of these drugs is to be preferred to quinine and atebrin. Other work has been carried on at the Malaria Research Station, Tallahassee, Florida, at the Johns Hopkins University, Baltimore, at the Howard University, at Chicago University, at the Molteno Institute, Cambridge, England, and in India at the Pasteur Institute, Coonoor, Madras Presidency, and elsewhere.

Surveys and control studies in connexion with *A. gambiae* have been undertaken in parts of Brazil and other surveys in Cuba, in China, in India and in Portugal, with control demonstrations and field studies in Georgia, N. Carolina, El Salvador, Peru, Portugal, China and Brazil.

For the no less important field activities and studies in tuberculosis and diphtheria, in mental hygiene, in nutrition, and for the generous aid given to State and local Health Services, to laboratories, to sanitary engineering, to public health education, to schools of hygiene and of nursing, readers must turn to the detailed Report. In this account the reviewer has tried to indicate a few of the chief lines of work carried out by a body whose benefactions are of permanent service, far-reaching and of incalculable worth. *H. Harold Scott.*

ROCKEFELLER FOUNDATION. **Annual Report, 1941** [FOSDICK (Raymond B.), President].—pp. xi + 425. With 21 figs. on 12 plates. New York: 49 West 49th Street.

WAR OFFICE. **Memoranda on Medical Diseases in Tropical and Sub-Tropical Areas, 1942.**—305 pp. With 77 figs. & 35 plates. 1942. London: H.M.S.O. [3*s.* 6*d.*]

The seventh edition of this book is an improvement on the sixth; it is some 25 pages longer, many additions have been made and there has been some re-writing. Sections now included for the first time are those on lymphopathia venereum, pellagra, rabies, rat-bite fever and sickle-cell anaemia, while the Rickettsial diseases are brought together under one heading. It seems a pity, however, that there should still be two sections for leishmaniais, one for kala azar and the other for oriental sore, separated by 48 pages devoted, under the alphabetical scheme of classification, to malaria, myiasis, etc. In the preface it is

stated that the book is not claimed to be more than a series of miscellaneous memoranda arranged in alphabetical order, but a more ambitious programme could have converted it into a complete text-book; as it is it can only be regarded as a supplement to larger works which cover the whole field. It is also an unfortunate economy which has decreed that it be bound in paper—books meant for hard use should have strong covers.

Nevertheless, the quality of the information and the method of presentation reach a high standard. Much recently reported work has been noted and certain omissions from the previous edition have been rectified. Mistakes are few, but the howler on p. 20 has persisted—*Hymenolepis diminuta* and *Dipylidium caninum* are stigmatized as trematodes. Diarrhoea is still ascribed to the swallowing of sand and exposure to chill; it is odd to read, on p. 218, that the only geographical distribution of trench fever is apparently in North Africa, though this is expanded on p. 226. *C. W.*

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